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GENERAL FEATURES OF THE MODEL B  
  
Five spindles te provide sufficient tooling positions, producing the best quality of work. We also have various attachments which may be added to eliminate secondary operations. A regular and oversize machine can be adapted to any of the three cycles by changing of the motor pulley, (75, 60, or 45 cycle). A 75 cycle machine indexes in -40f a second. The 60 cycle machine indexes in .5 0f a second. The 45 cycle machine indexes in .66 of a second. Cams on the machine are calculated in hundredths, from 0 to 50 is the working portion and 50 to 100 is the high speed or index portion. The index time is the total idle time required to withdraw tools, index carrier, feed stock, and return tools to the working positions. There are charts marked 75 cycle for the wide range of spindle change gears for the 75 cycle, 60 cycle chart for the 60 cycle machine and the 45 cycle chart for the 45 cycle machine. There are a wide range of feed change gears for the 75 cycle, the 60 cycle, and the 45 cycle. See the charts for each particular cycle. When a machine is received it should be carefully examined to  
make sure it has not been damaged in transit. If it has been damaged, notify the carrier and Davenport Machine, Rochester, New York. After the crate has been removed, check all parts such as cams, wrenches, gears, and so forth with the packing list. Thoroughly clean the machine of all slushing grease. The machine should be  
leveled and wired. The machine can be leveled by placing a straight edge on the cross slides, on which a bubble level can be placed to see if the sides are level. The center drive can also be used as a straight edge on which a bubble level can be placed, to see if the ends are level. The’machine should have the corner pads inserted  
under it at the time of leveling and align stock reel to the machine, then lag the stock reel stand to the floor.  
  
The machine should be well OILED with the gun supplied. Fittings are for oil only - not crease. Fill the lube gun with Mobil DTE Oi1 Heavy, or its equivalent, TIS0-100-VG oil and also the Bijur lube pump reservoir. Check for nuts and bolts that may have loosened in transit. Install required cams in both tool spindle and cross slide  
area. Now turn the machine over by hand at least one complete cycle to make sure nothing is binding.  
  
CAUTION ~- Do not run the machine if low pressure is less than five pounds and high pressure is less than fifty pounds. NOTE – See further coiling instructions. NOTE ~ If, for any reason, the gauges are disconnected, remove spindie change gears and push flush button on unit until air is purged from line and reconnect. Align the wire case carrier and connect to machine. Without spindle gears, start the machine, engage the starting hand lever, depress flush button on lubricator for 30 minutes, stop the machine, and put on the spindle gears. Approximately 900 R.P.M. is desired for breaking in the machine. Keep the flush button on the lubricator fully depressed for 5 minutes after each gear change. CAUTION - Never revolve spindles without indexing the head as the spindles are oniy lubricated in the 4th position. Run the machine at approximately 900 R.P.M. for 2 hours. Change

RETAINING CHUCK THRUST SPINDLE  
  
CAM SLIDE BEARING GEAR  
CHUCK  
enemas Deven LEVER SPINDLE FRONT  
EXTENSIONS BEARING NUT  
  
SPINDLE FRONT  
BEARING HOUSING  
  
WORK  
SPINDLE  
COLLET  
(CHUCK)  
CHUCK NUT  
CHUCK” vven LEVER o  
ADJUSTING sieeve FULCRUM  
NUT  
THRUST SCREW  
  
LOCKING NUT -©= BEARINGS  
  
| |

## Page 4

9 eabeg  
  
WORK  
SPINDLES  
  
pe  
  
APH  
AS AE  
  
OUTER SAAS  
SUPPORT =  
  
(ZZZCLL LLL  
  
rhs  
  
Y,  
  
j  
maid  
  
CLZELLLEL ILL  
  
7.  
  
CHUCK & FEED  
CAM  
  
Y my  
  
ANS  
  
ADJUSTABLE  
INDEPENDENT  
  
POSITIVE  
CAM  
CARRIER RETURN  
CAM

## Page 5

the spindle gears and run it approximately 1500 R.P.M. for 8 hours. Again, change the gears and run it approximately 2000 R.P.M. for 8 hours. Continue this procedure until we have run 8 hours at 2500  
R.P.M., then at 3000 R.P.M. for 8 hours. Pay close attention to the bearings that may run hot. If any bearing does run hot, drop back a step, check that bearings are getting lubrication, and run until it  
remains normal. Then proceed to the next faster speed. After the machine has been in operation for several days, it should be inspected very carefully to make sure all nuts and screws are tight.  
  
Coolant tanks should be filled with a good grade of cutting oil for the job to be run. You can be producing parts while the machine is breaking in. Select from the charts at approximately 750 R.P.M. the same effective revolutions as is required to do the job at the desired R.P.M. Repeat this procedure until you have obtained the desired cycle time and R.P.M. Chucks and feed fingers should be removed occasionally and thoroughly cleaned. Also, the inside of the inner spindle and the inside of the nose of the outer spindle should be wiped clean with an OSHA approved solvent and boiler brush to remove the sludge which accumulates and would effect the chucking and feeding mechanism. After cleaning, swab with lubricating oil.  
Now oil and insert collets and feed tubes. The work spindles always revolve forward or counterclockwise as in a lathe, making it possible to use right hand cutting tools exclusively. The work spindle carrier also indexes in a counterclockwise direction bringing the work from position to position. The work spindle carrier has an outer support which carries the weight of the wire case carrier, and is so designed that the feed tubes may be removed without disturbing this support. The support is indexed on rolls. The rolls are adjusted by means of an eccentric.

INDEPENDENT AND ADJUSTABLE FEED FOR EACH TOOL  
Each tool is operated by an independent cam and cam lever and is easily adjusted for depth of cut by the use of a turnbuckle which requires no clamping. All regular cam levers have a graduated face on which the sliding block may be raised or lowered to vary the feed of the tool on most by 20% (all end working 20%; cross slides lst, 2nd, 4th, and 5th position arm 20%; 3rd position arm is 10%). All these levers have a 3/4 diameter roll. In the third tool spindle position a special 2:1 cam lever can be used, and in the fourth tool spindle position a special 2.5:1 cam lever. These cam levers have 5/8 diameter rolls. Independent and adjustable compensating stops for lst, 2nd, and 4th forming slides and 3rd position rear tool arm insure the same size work from all spindles. A special stop can be mounted on the cutoff arm to allow light forming to be done on the work in the burring spindle after the piece is cutoff.

SLIDING  
LOCK  
  
TURNBUCKLE  
CARRIER (HEAD)  
  
TOOL SPINOLE  
  
CARRIER (HEAD)  
  
WORK SPINDLE  
  
STOCK STOP  
ADJUSTING SCREW  
  
Page 8

## Page 7

6 bed  
  
25  
  
FEED TUBE STARTS 26  
BACK (26)  
  
TOOL SPINOLE-742 DIA. CAM CROSS SLIDE-6" DIA, CAM————  
  
95.5 HEAD LOCKED  
  
94.5 CLUTCH SHIFTS  
TO LOW SPEED  
  
68  
  
61 FEED TU  
  
WITHDRAW TOOLS,  
TOOLS MUST BE OFF  
WORK AT 59  
  
Le cuurew SHIFTS TO HIGH SPEED  
  
84 CHUCK CLOSED  
63 CHUCK OPENING LEVER FULLY RETURNED  
  
BRING 92.5 END OF INDEX  
(\*——— TOOLS.  
FORWARD  
  
“  
  
85 OF CAM= Lm HEAD TRAVEL AT SPINOLE CENTER  
100 32  
  
TAKE UP  
BACKLASH  
  
HEAD 1S ig FROM POSITION  
  
\,  
7.5 “2 INDEX  
  
75  
  
CHUCK CLOSING FULLY BACK  
"  
HEAD MOVED. Yq  
  
65 START OF FEED  
64 CHUCK OPEN  
  
62.5 START OF INDEX  
  
BE BACK  
  
$9 HEAD STARTS TO UNLOCK

## Page 8

OT e6eg  
30T-I6P & GOT-I6P  
  
30T OR 6OT OR 72T GEAR  
COMPOUND GEAR  
  
DRIVER GEAR ENGAGES WITH EITHER  
  
COMPOUND GEAR  
24T-I6P & 72T-I6P  
  
=  
Saye WORM HAS 6 STARTS  
> aed .445P 10 TO | RATIO  
Fd gpd Su :  
ra Qo =  
3 ge8F ER CHUCK & FEED CAM  
. oO « pe  
= 6'bIA CAMS, 251, HOLE 5 é 5 i EI  
ire - ! P4  
a « [zg SQKEY—— FF iy CHUCK OPENING  
= 6 {Ee ” |  
= Bw CHUCK CLOSING  
2 2 (2 8 FRONT CAM ff seaite 2  
SS leg SHAFT - a j STOCK FEEDING  
3 | z i STH  
3s 3 < a ST = 2ND  
Fj <« & les \_\_\_-— GENEVA DISC  
ES) 3 a [ez (5 SLOTS)  
ae] 3  
oO  
2  
ef  
za  
goa a ot  
E32) oer oh) oo SPINDLE CHANGE GEARS  
Ee Lf 4TH [2  
——=—\_—= —\_ o——  
oor tt  
— THREADING GEARS  
eq STL THRDG 32-32 GEARS  
6 BRS THRDG 36-27 GEARS  
;  
ke oa  
BPE  
Ze az 1501 RPM  
=>% 2° (i217 RPM)  
& “2 3g 933\_RPM 8.6 PD. PULLEY  
EE xt  
eo Or  
if sy ro MOTOR PULLEY  
wi 7.4P.D  
= (304 RPM) pales  
= 40T-I2P [233 RPM] ae aed  
ia + q 4 = = .  
1 5 HIGH SPEED CLUTCH \2P (| |) 7) HP  
e  
50 RPM  
a3 —— i508 RPM) | B 1745 RPM  
tc Ze [466 RPM]  
35 62 8 ORM HAS 6 STARTS .445 R 50 RPM)  
o3 wh & 10 TO | RATIO (456 RPM) OK-35 1007 RPM  
@d 8 Ss 563 RPM (0K30 953 RPM)  
wo FS 08 QK-22 974 RPM]  
2 z = Z unan  
az + GEAR LAYOUT OF MODEL B  
  
NOTE- |) FIGURES IN BRACKETS [ ]  
75 CYCLE FOR 45 CYCLE MACHINE  
  
2) FIGURES IN PARENTHESIS ( )  
VE! /,  
i MC ONERI NS ORATIONS OW FOR 60 CYCLE MACHINE  
  
ROCHESTER, NEW YORK

## Page 9

TT s6eg  
  
TO FIGURE INDEX TIME:  
  
The motor speed times the pitch diameter of the motor pulley divided by the drive shaft  
pulley pitch diameter times (934) gear divided by large gear on compound gear (MB-41l) times  
the small gear on the compound gear (MB-41) divided by driving clutch gear times quick index  
drive gear divided by quick index driven gear times (bevel gear) driving clutch bracket gear  
  
divided by (bevel gear) on end worm drive shaft times worm on wor  
  
front worm wheel equals R.P.M. of cam shaft during index.  
  
The following is an example of how to figure index:  
  
(75Cycle)  
Motor Motor Small Gear Quick Index  
Speed Pulley (934) Gear Compound Drive Gear  
1745 x 7.4 x 32 x 26 x 80  
1 8.6 32 Large 104 40  
Drive Gear Driving Quick Index  
Shaft Compound Clutch Gear Driven Gear  
Pulley  
  
Now looking at the above calculations,  
index time can be changed.  
  
TO FIGURE HIGH SPEED TIME IN SECONDS  
  
Bevel  
Gear  
x 24  
24  
Bevel  
Gear  
  
-8 = .4  
  
60 Seconds divided by 75 cycle (Indexes in High Speed) =  
2  
  
m drive shaft divided by  
  
Worm Cycles Per Minute  
x 6 = 75.08  
60 R.P.M. of Cam Shaft  
Worm  
Wheel  
  
it can be seen that by changing the motor pulley,  
  
of a Second  
  
2 From 50 to 0

## Page 10

ZT ebed  
  
TO FIGURE WORKING TIME IN SECONDS  
  
The motor speed times the pitch diameter of the motor pulley divided by the drive  
shaft pulley pitch diameter times (934) gear divided by large gear on compound gear (MB-41)  
times the small gear on the compound gear (MB-41) divided by driving clutch gear times  
idler shaft driving gear divided by idler shaft driven gear times change gear divided by  
meshing compound gear times other segment of compound gear divided by clutch body gear times  
worm divided by worm wheel equals R.P.M. of Cam Shaft during working (0-50) portion of time  
cycle.  
  
The example shown below is at 75 indexes using a 75 tooth change gear to attain 1.2  
seconds cycle time:  
  
(75Cycle) Small  
Motor Motor | Gear Idler Shaft Change Compound  
Speed Pulley (934)Gear Compound Driving Gear Gear Driven Gear Worm 37.54  
1745 x 7.4 x 32 x 26 x 32 x 75 x 60 x 6 = R.P.M.  
1 8.6 32 104 60 30 86 60 of  
Drive Large Driving Idler Shaft Compound Clutch Body Worm Cam  
Pulley Compound Clutch Driven Gear Gear Gear Wheel Shaft  
  
Shaft Gear Gear Drive  
  
60 Seconds divided by 37.54 R.P.M. of Cam Shaft = 1.6 = .8 Working  
2 2 Time (0-50)  
  
-8 Working Time plus .4 Index Time equals 1.2 Cycle Time.

## Page 11

€T o6eg  
  
LEFT  
  
SPINDLE  
COMPOUND CHANGE  
GEAR GEARS  
  
ni  
PRET  
gS  
  
NuT STARTING CLUTCH DRIVE  
HUB GEAR SHAFT BELTS  
  
4  
}  
it  
:

## Page 12

PT abeg  
  
DRILL 2 HOLES AFTER ALIGNING SHAFT WITIL x  
BEARINGS ON OTHER END.  
  
CLAMP TIGHT & DRILL WITH “D” (.246) DIA.  
DRILL 1" DEEP  
  
REAM .246 DIA. HOLE IN GUARD To .250 DIA.  
& DRIVE IN DOWEL PINS.  
  
LOCATE BOTH HOLES IN ASSEMBLY.  
  
838  
  
MRA 843  
  
Ye RY  
  
PI  
x%  
MB  
Ee)  
835 |  
x  
QA ZZ CN He  
WSsn Ns  
a (0 Qt —- a < LL  
| Zu V, Ze ranin Mit 1-1  
pee JU JUTE UU a a 8.6P.D.  
\N hip 7 me  
ax  
aa  
BEND YANG OF LOCK WASHER  
Lee AS SHOWN.  
MB.  
-2  
LOCKNUT & WASHER ASSEMBLY PROCEDURE  
1} MOUNT THE BEARING ON TAPERED SEAT OP  
ADAPTER SLEEVE WITH LOCKNUT AND WASHER  
MOUNTED SNUGLY AGAINST THE FACE OF THE  
BEARING INNER RING. HAND TIGHTEN UNTIL  
A SLOT AND A TANG LINE UP. BROWNING  
BELT  
2) MARK LOCK WASHER TANG AND MATING SLOT, #B-60  
  
3) MARK THE 11th TANG CLOCKWISE FROM  
ORIGINAL MARK.  
  
4  
  
TIGHTEN LOCKNUT UNTIL MARKED {SLOT)  
AREA LINES UP WITH THE llth TANG.  
  
the x We 5) PEEN LOCK WASHER TANG INTO LOCK NUT SLOT,  
  
NOTE: MB-43 PULLEY IS LOCATED APPROXIMATELY  
1/4" FROM MB-2.  
  
NOTE: TAPER SLEEVE IN BEARING MUST BE  
TEMPORARILY KEYED TO MB-9 SHAFT WHEN  
TIGHTENING LOCK NUT. REMOVE KEY AFTER  
ASSEMBLY .

## Page 13

STOCK  
INSERTING  
  
“o" RINGS  
  
ESTES  
  
OUTER  
TUBE  
\

## Page 14

BODY GEAR  
R  
  
80 T CLUTCH  
fet  
  
Page 16

## Page 15

TOOL ARM NUT TOOL ARM NUT TOOL ARM  
  
THIN THICK STUD  
GENEVA MOTION GENEVA  
STAR WHEEL DISC GEAR  
  
Lt ebed  
  
DAVENPORT  
MODEL B  
2 WAL NO.)  
  
tte POSITIVE  
  
RETURN  
CHUCK &  
FEED CAM  
  
CHUCK & FEED ainsal  
  
CAM INDEX ROLL  
  
FEED  
RACE  
CHUCK  
  
CLOSING  
  
CHUCK  
  
OPENING WORM WORM

## Page 16

8T ebeg  
  
DRIVEN PULLEY  
DRIVE SHAFT LONG .  
  
LUBRICATOR  
PULLEY  
  
MOTOR PULLEY  
{ DRIVER)  
  
7 “2 H.R MOTOR  
  
TURNBUCKLE

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All regular cross slides and tool arms are operated from the cam  
shaft on the front of the machine. A positive return has been pro-  
vided for the lst position cross slide. An optional attachment, the  
4th position cross slide, can be purchased. This attachment is oper-  
ated from the extension on the tool spindle cam shaft.  
  
The chuck and feed cam permits the feeding of a bar of stock of  
the largest diameter and the maximum length of feed by simply feeding  
against the polished stock stop. Length of stock to be fed can be  
quickly changed by a crank conveniently located on the feed slide at  
the front of the machine.  
  
After the stock has been inserted into the carrier, it can be  
loaded into the collets by a simple stock loading mechanism. This  
is so designed, that the operator can insert all five bars into the  
collets without leaving the operating position.  
  
When changing from one cycle time to another, it is necessary to  
change only one feed gear. Hardened plate type cams are used and are  
mounted on carriers, making it easy to change cams. The carriers have  
keys which indicate "0" on the cam shaft. When putting cams on the  
tool spindle carrier be sure the key is at the top and rise or letter-  
ing is on the left hand side. The tool spindle cams are put on with  
the 3rd position cam on first, followed by 2nd, 4th, lst, and 5th.  
  
When putting the cams on the front carrier the lettering faces  
down and the rise is on the right hand side. The front carriers  
sequence is 3rd, 2nd, 5th, lst, and positive return cam. Extra cam  
carriers can be purchased, making it possible to assemble cams for  
a new set up while the machine is still in operation on its present  
job, thus reducing the set up time.  
  
THE POWER SUPPLY OF THE MODEL B  
  
Machine is powered by a 7-1/2 H.P., totally enclosed, fan cooled,  
ball bearing motor which drives two V Belt Drive pulleys. The driven  
pulley is an 8.6 pitch diameter and the motor pulley driver for the  
75 cycle is 7.4 pitch diameter. For 60 cycle, it is 6.0 pitch dia-  
meter, and for 45 cycle it is 4.6 pitch diameter. As you will note,  
it will only be necessary to change the one pulley to get the various  
cycles. There are four matched belts of even length for this drive.  
The final tension on these belts is applied by a turnbuckle attached  
to the motor mount. Next on the drive shaft long (MB-9) we find  
another pulley which is used for the lubricator. At 75 cycle the  
lubricator is driven at approximately 1000 R.P.M. Further to the  
left is the 32 tooth gear (934). It is secured to the shaft by a  
left hand nut. This gear in turn drives a 32 tooth compound gear  
which is (MB-41) a 26 tooth portion of the compound gear meshes the  
104 tooth driving clutch hub gear (5080-227-4). An operator stand-  
ing in the front of the machine pushes the starting shaft hand lever  
(5080-383) to the left. This engages the clutch, driving the start-  
ing clutch drive shaft (5080-141) as we proceed to the left on this  
shaft we find an 80 tooth gear which is the quick index gear (5080-50).  
It engages with the 40 tooth quick index driven gear (5080-51). You  
  
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## Page 18

oz ebeg  
  
CONNECTING  
PIN  
  
FEED GEAR FOR  
TIME CYCLE  
  
(OLER  
SHAFT  
  
CLUTCH  
BODY GEAR  
  
ROLL AWAY  
CLUTCH  
  
WORM  
ORIVE  
SHAFT  
SHORT  
  
WORM  
WHEEL  
  
HIGH SPEED CLUTCH  
TF Leyer  
a = +o @SCREWS NO =  
, HIGH SPEED  
CLUTCH FORK LEVER -\_  
9  
i" 2 \_—  
QUICK INDEX  
DRIVE  
H e  
CLUTCH  
DUSTING NUT 5 Z  
CLUTCH DRIVE SHAFT -/ —>\— ears  
c)  
R7 Fi  
oe “ “ ,  
Mt : — ee ——\_\_- ‘he  
% ry  
i ‘eq | —  
QUICK INDEX  
ORIVEN GEAR -  
STARTING  
CLUTCH  
WORM IDLER SHAFT HIGH (OLER SHAFT WORM  
DRIVING GEAR SPEED ORIVEN GEAR DRIVE  
CLUTCH SHAFT  
  
LONG

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will bypass these gears as in low speed they are idlers. We next  
come to another set of gears, a 32 tooth idler shaft driving gear  
(5080-127) driving a 60 tooth idler shaft driven gear (5080-126) .  
This gear in turn drives the idler shaft (5080-122). On this shaft  
is placed the gear of the desired time cycle. For more information  
on this, refer to feed change gears. You will note, that we end up  
with an 80 tooth gear. This is the clutch body gear (5080-131-1).  
Within the clutch body gear is a rollaway clutch. This gear drives  
rear worm drive shaft short (5080-139-2). On this shaft is a worm  
(5080-61) which drives a rear worm wheel (5080-20). The ratio of  
the worm to the worm wheel is 1:10. Attached to the rear worm wheel  
is a quick index clutch cam (5080-85). As this rotates it moves a  
lever up and down to allow the machine to engage into high and low  
speed. Now to go back to the 80 tooth quick index drive gear (5080-  
50), driving the 40 tooth quick index driven gear (5080-51). We shift  
the machine into high and the quick index gear will drive the quick  
index driven gear which in turn drives the worm drive shaft long  
(5080-139-1) which is coupled to the rear worm drive shaft short  
(5080-139-2). We are now driving through the high speed side and  
override the rollaway clutch by putting the rolls back into a neutral  
position for the length of the index. Look at the rear worm drive  
shaft short (5080-139-2) and see that the rear worm wheel (5080-20)  
drives the rear cam shaft at a speed of 1/10 of the shaft (5080-139-2).  
Following the worm drive shaft long (5080-139-1) to the extreme right  
end, we find the driving clutch bracket gear (5080-136-2). This is  
a 24 tooth bevel gear which meshes with 24 tooth bevel gear (607).  
Which in turn drives the end worm drive shaft .(5080-140-2). Another  
worm is on this shaft that drives the front worm wheel (5080-82).  
' NOTE - If the machine is out of time, it may be timed by this set of  
bevel gears by slipping it one tooth one way or the other. The worm  
drives this worm wheel also 1/10 the speed, therefore, both cam shafts  
will run at the same rate of speed. Attached to the chuck and feed  
cam is a chuck and feed cam index roll (5180-2). This roll is so  
positioned that as the machine indexes into high speed the roll is  
inserted into the slots of the Geneva motion star wheel (5134-1).  
Attached to the Geneva motion star wheel is the Geneva disc gear. This  
gear has 75 teeth and is indexed as the Geneva motion is indexed by the  
roll on the cam. This gear meshes with the revolving head-gear (5133)  
which also has 75 teeth, indexing the revolving head. Located on the  
front cam shaft (5080-69) is the locating cam (5080-75). This acti-  
vates the locking and unlocking of the locating lever (5080-34-1).  
This lever locks the carrier into position for the machining to be  
performed during the working portion of the cycle (0-50).  
  
The locating and clamping lever, which locates and clamps the  
carrier (or head), should be checked occasionally to make sure it  
is locking securely. If not, the lever should be adjusted just  
tight enough to resist a lead hammer blow directly over the locating  
block without causing the roll on the bottom of the lever to move  
freely. Before attempting this procedure disengage the starting clutch.  
When tapping the top of the lever with the hammer, use one hand to feel  
the roll. NOTE - There must be a drag on the roll. More pressure may be  
applied by loosening the cam lever screw bushing (5080-35-SB) and turning  
screw (5080-35-SS) clockwise. Then tighten cam lever screw bushing  
(508-35-ISB) and turning screw (5080-35-SS) clockwise. Then tighten  
NOTE - When machine is running, the roll must be turning, not skidding.  
  
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## Page 20

WORM  
  
ROLLER  
BEARING  
  
esostsessy  
  
S  
[aN  
  
i  
=x  
s  
ee |  
po ae  
J  
FAN y  
\_ on LESS 4 « me &  
“Sl (@® WNW ani if en | BAAS ag  
NS: XA y me a Be A  
S LSS mae 872 C3  
Do ese ONAN  
Rr w b  
2 <  
  
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## Page 21

€Z abed  
  
GENEVA MOTION  
STAR WHEEL  
  
CAM LEVER  
SCREW BUSHING  
  
SCREW  
  
LOCKING LEVER ROLL  
  
LOCATING CAM  
  
STARTING CLUTCH (|  
HAND LEVER CT  
  
LOCATING  
LEVER  
  
REVOLVING  
HEAD GEAR  
  
LOCATING  
  
GENEVA  
DISC GEAR  
  
SPINDLE INTERMEDIATE GEAR  
(RING GEAR)  
  
CARRIER  
(HEAD)  
  
LEFT  
HAND  
NUT  
  
DRIVE  
SHAFT  
LONG

## Page 22

PZ abed  
  
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## Page 23

SPINDLE SPEEDS  
  
The spindle change gears are located on shafts (651-A-5) and  
(626-A-1). There are 27 various combinations that can be obtained;  
75 cycle range 500 R.P.M. to 4500 R.P.M., 60 cycle range 400 R.P.M.  
to 3600 R.P.M., and 45 cycle range 311 R.P.M. to 2799 R.P.M. The  
driving gear is on the shaft 651-A-5 and the driven gear in on shaft  
626-A-1. On drive shaft MB-9 the thread is left hand as is the large  
thread on shaft 626-A-l1. The inner end of shaft 626-A-1 has the gear  
934 (and left hand nut 945) which drives the spindle intermediate  
(936) ring gear which drives the work spindles. The compound gear on  
651-A-5 drives the starting clutch on the feed train.  
  
FEED  
  
When changing the feed it is necessary to change but one gear.  
For direct high, there is no gear required on the idler shaft (5080-  
122). To maintain high speed for the entire cycle, slide the pin  
(5080-117) out of the engagement of the high speed clutch fork lever  
(5080-77), lift high speed clutch lever (5080-76) to the high speed  
position. To maintain direct low, use same procedure as above, but  
push the high speed clutch lever (5080-76) down to the low speed posi-  
tion. This will now give you an equal number of revolutions from 50  
hundredths to 100 hundredths, as you had from 0 hundredths to 50 hun-  
dredths. Example 75 cycle 1.2 Second:  
1.2 Seconds Cycle Time in Chart  
- .4 Indexing Time for 75 Cycle  
-8 Working Time from 0-50  
, x 2 Equals 0-50 and 50-100  
1.6 Direct Low  
  
When using the low speed side, the chart should be consulted to deter-  
mine which feed gear is needed for the desired revolutions. The chart  
is figured from 0 to 45 hundredths, which applies to many of our stand-  
ard cams. To find the actual revolutions of the working time on the  
low side from 0 to 50, select any of the numbers in the boxes in the  
chart, divide by 45 and multiply by 50. The range of the 75 cycle  
machine can be run from .8 of a second to 18.4 including an index  
  
time of .4 of a second. The 60 cycle machine can be run from 1 second  
to 22.69 of a second including an index time of .5 of a second. The  
range of the 45 cycle is 1.3 to 29.6 seconds including an index time  
of .666 of a second. There are approximately 64 combinations of feed  
gears that can be used. To obtain the fastest range put the change  
gear spacer on the idler shaft (5080-122). Then install the desired  
feed gear. Loosen the feed change gear arm clamping stud (5080-192).  
Now swing the feed change gear arm so the feed gear chosen will mesh  
with the 30 tooth portion of the 30 tooth/60 tooth compound gear.  
Tighten the feed change gear arm clamping stud (5080-192). The 60  
tooth portion meshes with the 80 tooth clutch body gear (5080-131-1).  
(This will give you a combination of feed gear driver, 30 tooth  
  
driven compound, 60 tooth driver compound, 80 tooth driven.) To run  
the machine in the medium range, move the spacer from the idler shaft  
(5080-122), install the desired feed gear and replace the spacer on  
the idler shaft (5080-122). Now mesh the 60 tooth portion of the  
  
Page 25

## Page 24

972 abed  
  
WORM SHAFT  
GEAR SPACER  
  
-005 CLEARANCE MIN.  
  
CLUTCH HARDENED  
  
BODY  
REVERSE ROLLS  
  
CLUTCH  
  
ROLLER  
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WORM DRIVE ! evuTen '  
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SHAFT EXTENSION <\_<  
  
SLEEVE CLUTCH SECTION A-A  
  
A BODY GEAR

## Page 25

compound gear with the feed gear chosen. (It will now be feed gear  
driver, 60 tooth idler, 80 tooth driven). To run the slowest range,  
put the spacer on the idler shaft (5080-122) then install the desired  
feed gear. The feed gear chosen will mesh with the 72 tooth portion  
of the 72 tooth/24 tooth compound drive gear. The 24 tooth portion  
now will be feed gear driver, 72 tooth driven compound, 24 tooth  
driver compound, 80 tooth driven.) Located inside the 80 tooth clutch  
body gear (5080-131-1) is a rollaway clutch which drives the worm  
shaft while in the low speed. The rollaway clutch has four, hardened  
rolls of exactly the same diameter that engage the clutch body (5080-  
131) when the machine shifts into low speed. After extensive use of  
the machine, indentations may be seen in the clutch body (5080-131).  
This could keep the machine from shifting. The indentations should be  
removed from the four sides of the clutch body by grinding them uni-  
formly. They should not vary over .0005 across from flat to flat.  
  
New rolls must be replaced to compensate for the material that was  
qround away.  
  
THE ROLLAWAY CLUTCH  
  
The rollaway clutch consists of several components. The clutch  
body (5080-131) which has four flats accurately ground to within  
.00025 from center. Upon these flats are placed four hardened rolls  
(5080-114-1) that are ground within .0002 diameter. The rolls are  
positioned by a roller clutch cage (5080-131-6) and are inserted into  
roll clutch sleeve (5080-130). When in low speed the 32 tooth idler  
shaft driving gear (5080-122) drives the 60 tooth idler shaft driven  
gear. The desired feed gear is installed on the idler shaft (5080-  
122). This gear train finally drives the 80 tooth clutch body gear  
in which the rollaway clutch is installed. Since there is no move-  
ment in the rear worm drive shaft short (5080-139-2), the thrust  
of the 80 tooth clutch body gear moves the rolls from a neutral  
position by pushing the rolls off center to a driving position, thus  
driving the low speed side. At 50 hundredths the high speed clutch  
is engaged, this means that the 80 tooth quick index drive gear (5080-  
50) is now driving the 40 tooth quick index driven gear (5080-51) and  
driving the rear worm drive shaft short (5080-139-2) at a higher R.P.M.  
putting the rolls in the rollaway clutch into a neutral position thus  
the drive from the idler shaft (5080-122) will have no effect.  
  
If for any reason the clutch body is removed or replaced, be sure  
there is approximately .005 clearance between the end of the clutch  
body roller clutch cage and the inside face of the roller clutch  
sleeve.  
  
CAM SHAFTS  
  
Each cam shaft is driven by a large coarse pitch worm wheel, which  
is larger in diameter than the cams. Worm shafts are mounted on ball  
and taper roller bearings running in a bath of oil, the taper roller  
bearings takes the thrust of the worm shaft. The cam shaft located  
on the front of the machine actuates the feeding of stock, opening and  
closing of the chuck, indexing and locking the spindle carrier, and  
all the side working positions. The tool spindle cam shaft located  
  
Page 27

## Page 26

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TAPER FRONT ROLLER  
BEARING WORM WHEEL BEARING

## Page 27

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BODY GEAR  
  
ROLL AWAY  
  
CONNECTING  
PIN  
  
FEEO GEAR FOR  
TIME CYCLE  
  
IDLER  
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CLUTCH  
  
WORM WORM  
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SPEED DRIVEN GEAR  
CLUTCH  
  
WORM  
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LONG  
  
STARTING  
CLUTCH  
  
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at the right hand end of the machine operates the five tool spindles,  
threading clutches, high speed clutch, fourth position cross slide.  
  
To put the machine in direct low, slide the connecting pin (5080-  
117) from between the screws on the high speed clutch fork lever  
(5080-77). Push high speed clutch lever large (5080-76) down so  
machine is in low speed.  
  
Now open the cover on the gear box and push the reverse clutch  
(5080-396) in until the tangs engage the slots in the clutch body  
(5080-131). This will allow you to move the tool spindle cam shaft  
backward and forward with your handwheel.  
  
If it is ever necessary to retime the cam shafts and timing cams  
are not avaliable, the following procedure should be followed: Use a  
standard form and cutoff cam on the front cam shaft, and a standard  
turn and drill cam in the fourth position. Stop the front cam shaft  
when the roll on the cam lever is on the high point (50 hundredths),  
just before dropping off the standard form and cutoff cam to determine  
if the machine is out of time. Check the roll on the fourth position  
cam, this should also be on 50 hundredths. If the machine is out of  
time remove the nut on the end of the worm shaft long (5080-139-1),  
and loosen the screws holding the casting, driving clutch arm (5080-60-  
1), which forms the outer bearing. Moving this casting to the right  
allows the bevel gears to be disengaged.  
  
You can now manually turn your handwheel-to move the tool spindle  
cam shaft backward or forward until the roll in the cam lever is on  
the 50 hundredth mark; matching the same position (hundredth) as the  
roll on the form cam. Now the machine is back in time; mesh the bevel  
gears. NOTE - Handwheel can be turned to insure the bevel gear teeth  
to mesh properly. Fasten the outer bearings in the original position  
and replace the nut at the end of the worm shaft. Withdraw the tangs  
on the reverse clutch (5080-396) from the slots in the clutch body  
(5080-131). Push high speed clutch lever large (5080-76) up and slide  
connecting pin (5080-117) in between the screws on the high speed  
clutch fork lever (5080-77). Now the machine is ready for production.  
CAUTION - Never leave reversing mechanism engaged when running the  
machine with the high speed clutch, as this may cause serious damage  
to the clutches and drive shafts.  
  
While the roll is on 50 hundredths in the tool spindle position,  
check the high speed clutch. The machine shifts into high at 50  
hundredths. The chuck lever sleeve (637-1) should be within 1/64" of  
the shoulder of the chuck lever fulcrum (635-NK). If it is not within  
1/64", adjust the screws in the high speed clutch fork lever (5080-77)  
to move the high speed clutch lever large (5080-76) which will move  
chuck lever sleeve (637-1) to within 1/64" of the shoulder of the chuck  
lever fulcrum (635-NK).  
  
Timing cams can be purchased, the form and cutoff timing cam,  
  
part number 3322, which has a 3/8" radius at "0". The turning and  
drilling and the high speed clutch timing cam is part number 3321.  
This cam has a 3/8" radius at "0" and "50". The same procedure  
  
should be followed as before, except the timing of the cam shafts  
  
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## Page 29

RETAINING CHUCK THRUST SPINDLE  
CAM SLIDE BEARING GEAR  
  
CHUCK  
FEED TUBE rover LEVER SPINDLE FRONT  
ASSEM EXTENSIONS BEARING NUT  
  
SPINDLE FRONT  
BEARING HOUSING  
  
WORK  
SPINDLE  
  
COLLET  
(CHUCK)  
  
TE beg  
  
TOOL  
POST  
STOP  
  
NUT  
  
CHUCK  
CHUCK” CHUCK LEVER  
  
ADJUSTING LEVER = FULCRUM  
NUT SLEEVE  
  
834-A  
SCREW  
  
THRUST SCREW  
  
LOCKING NUT  
  
I

## Page 30

will be at "0". For every hundredth the two cam shafts are out of  
time equals 2.4 teeth on the bevel timing gears. This is calculated  
as. follows: 75 cycle means that the cam shaft rotates 75 times in  
one minute in high speed and the rear worm drive shaft runs ten times  
as fast, 750 R.P.M. (The worm wheel to the worm being 1:10 ratio),  
therefore, if the worm wheel makes one revolution , the rear worm  
drive shaft makes 10. On the rear worm drive shaft is a 24 tooth  
bevel gear, this times 10 equals 240 teeth. Now divide this by 100,  
representing the hundredths on the cam and this will equal 2.4 teeth.  
Therefore, for every hundredth the cams are out of phase, the gear  
will be moved approximately 2.4 teeth. For 60 cycle, divide 60.8  
(actual) into'608 R.P.M., also for 45 cycle divide 46.6 (actual) into  
466 R.P.M. The following is an example that will help clarify this.  
  
10 R.P.M. of Worm x 24 Tooth Bevel Gear = 240 Teeth in One Revolution  
1 R.P.M. Worm Wheel J of Worm Wheel  
  
One revolution of worm wheel equals 100 hundredths of the cam, so then  
  
240 teeth = 2.4 Teeth Per Hundredth  
100 hundredths '  
  
750 R.P.M. Rear Worm x 1 R.P.M. of Worm Wheel = 75 R.P.M. of  
Drive Shaft on Cam Shaft Cam Shaft  
dL 10 R.P.M. of Worm  
  
’  
  
75 R.P.M. of Cam Shaft = 1 Revolution of Worm Wheel  
75 Cycles Per Minute  
  
WORK SPINDLE CARRIER  
  
Work spindles are hardened, ground, and super finished. The  
work spindle front bearings are of high grade phosphorous bronze,  
precision machined, making fitting or taking up unnecessary. These  
bearings are interchangeable, easily and inexpensively replaced,  
insuring alignment of all spindles. The worn spindles can be reworked  
and new bearings fitted at a nominal charge.  
  
The end thrust of the work spindle is taken by a double row ball  
bearing mounted on the inner spindle and held in a housing at the rear  
of the work spindle carrier. NOTE - The nut on the inner spindle that  
holds the bearing in is left hand, but the ball retainer nut (5080-  
390) in the bearing reatiner (5080-389) is right hand.  
  
The chuck, or collet, is screwed into the inner spindle and the  
outer spindle is moved endwise approximately 1/32" to open and close  
the chuck. A chuck adjusting nut is on the outer end of the inner  
spindle.  
  
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## Page 31

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LOCATING  
LEVER  
  
REVOLVING  
HEAD GEAR  
  
LOCATING  
  
STARTING CLUTCH  
HAND LEVER  
  
GENEVA MOTION  
STAR WHEEL  
  
CAM LEVER  
SCREW BUSHING  
  
SCREW  
  
LOCKING LEVER ROLL  
  
LOCATING CAM  
  
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LEFT  
  
~ CARRIER  
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GENEVA  
DISC GEAR  
  
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## Page 32

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ENGAGED —\_\_\_»  
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-005 MINIMUM CLEARANCE  
  
SECTION A-A

## Page 33

When the chuck lever sleeve (637-1) is moved to the right, it  
forces the chuck levers (2219-A) down. These levers push extensions  
(5080-2217) forward which moves the outer spindle over the chuck,  
closing the chuck on the stock. When installing new extensions, they  
must be exactly the same length. The chuck levers, when fitted in  
the fulcrum, must be fitted with the taper pin to depth; there must  
be no play or shake in the lever.  
  
After levers are fitted in fulcrum; place the fulcrum on a smooth  
surface plate so the heels of the chuck levers can be indicated. Both  
heels must indicate the same. If levers and extensions are not fitted  
right, a wobble will be seen in the spindle. As much as 50% of chucking  
torque can be lost if not fitted properly. NOTE - A plug the same  
diameter as the chuck lever portion of the inner spindle should be  
inserted to keep the levers parallel so the heels can be measured.  
  
The spindle gears are driven by an internal ring gear. The ring  
gear has a surface ground to it's pitch diameter. The hubs of the  
spindle gears are also ground to their pitch diameter and runs on this  
surface; thus, making a perfect roller bearing.  
  
Five blocks, accurately spaced, locate the spindle carrier, the  
locating side of the five blocks is parallel with the radial line  
passing through the center of the head. The other side is tapered and  
the locating lever is positively locked on the locating blocks.  
Caution must be taken that once the pieces are severed from the bar,  
they are caught in the delivery chute. Any loose pieces not caught  
in the chute of the machine can cause a jam. Two parts in particular  
can be damaged: the front cam shaft can be twisted or a rib in the  
revolving head can be cracked. (To check for a cracked rib take a  
-002 feeler gauge and see if it can be inserted between the locating  
block and the rib; if the feeler gauge can be pushed into a depth  
of approximately 1/4" it is very possible the rib is cracked. To  
further check, use either a form tool on a slide or a knee tool in  
a tool spindle.  
  
If there is a noticeable difference from one spindle, it is well  
to assume that the rib governing that spindle is cracked. A twisted  
cam shaft will be noticed by the fact that the locating lever will  
hit the top of the locating block. CAUTION - Do not run the machine.  
Cycle the machine by hand. (Running the machine under power may  
crack the ribs). If the locating lever hits the top of the block,  
  
back the machine up and remove the twisted cam shaft immediately.  
TO BACK UP THE MACHINE. MANUALLY  
  
If for any reason it is necessary to back the machine up, slide  
the connecting pin (5080-117) from between the screws on the high  
speed clutch fork lever (5080-77). Push high speed clutch large lever  
(5080-76) down so machine is in low speed. Next open gear box cover  
and insert tangs on reverse clutch (5080-396) into slots in clutch  
body (5080-131). Now turn the hand wheel counterclockwise and the  
machine will back up. Reverse the procedure to put the machine back  
in running order. CAUTION - Never leave reversing mechanism engaged  
when running the machine with the high speed clutch, as this may cause  
serious damage to the clutches and drive shafts.  
  
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## Page 34

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## Page 35

TOOL SPINDLE  
  
REAR  
BEARING  
  
COMPRESSION  
SPRING  
  
CLAMPING RING  
  
GRADUATIONS  
ON LEVER  
  
TURNBUCKLES

## Page 36

The work spindle carrier should be checked occasionally for end  
Play. End play causes the carrier to wear out of square, which makes  
it extremely difficult to hold length tolerances.  
  
The end play of the spindle carrier is taken up by five thrust  
screws in the cast iron ring at the rear of the spindle carrier. The  
spindle carrier is put into half index and the lock nuts backed off;  
the square head screws are then turned in until there is a slight  
drag on the head; there should be no end play but should be freely  
rotatable. Then secure the locking nuts.  
  
STATIONARY HEAD  
  
The stationary head has hardened and ground tool spindles. The  
front and rear bearing are of a high grade phosphorous bronze. There  
is a key in the rear bearing which prevents the spindles from turning.  
There is a compression spring in the spindle which assists the cam  
lever spring to follow the end working cam, when the cam drops off.  
  
The tool holders are held securely in the tool spindle by a clamping  
ring. The hole in all standard spindles is 3/4". Various spindles  
  
and front bearings can be purchased for special application. The  
stationary head is pinned in the bed by a taper pin (778). The spindles  
are connected to the cam levers by means of turnbuckles. The turnbuckle  
is made up of two link ends, one link end with a right hand thread the  
other with a left hand thread. A tension nut connects both link ends.  
There are notches around the nut denoting the left hand thread end.  
  
The links connect to the cam levers which in turn are activated by  
  
the cams. These levers have 3/4" diameter rolls. The upper part of  
the cam lever has a» "T" slot milled on an arc. The arc being graduated  
from .7 to 1.2. When this block on the cam lever is set at l, the  
  
tool travels the same distance as the rise on the cam; set at .7, the  
tool will travel 70% of the rise. If set at 1.2, the tool will travel  
120% of the rise of the cam. For example, if a cam with a rise of  
  
-500 inch is used and the block on the cam is set at .7, the tool will  
travel .350; if set at 1.2, the tool will travel .600. To determine  
position of the block on the cam lever, divide the distance the tool  
must travel by the amount of rise on the cam which will be used - .350  
divided by .500 equals .7; .600 divided by .500 equals 1.2. A special  
lever for the fourth position can be purchased which gives a ratio of  
2.5:1. It has a 5/8 diameter roll. In the third position we also  
  
have a special 2:1 cam lever which also has a 5/8 diameter roll.  
  
These particular cam levers are ideal when doing any deep drilling with  
several pull outs. These cam levers are in direct ratio with the cam.  
With the 2:1 cam lever you would need half the amount of rise on the  
cam as well as half the amount of drop. On the 2.5:1 you would have  
  
-4 the rise and .4 the drop on the cam. The fact that we have less  
  
of a drop for pullout gives us more surface on the circumference of  
  
the cam to give us more revolutions of working time.  
  
CROSS SLIDES  
There are two cross slides and two swing arms for forming or  
similiar work on the machine. Fourth position slide may be purchased  
  
if desired. Both slides and arms are operated from the front cam  
shaft. Each position is independently cammed and is operated by the  
  
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## Page 37

6e abed  
  
16 TOOTH GEAR  
  
THREADING SPINOLE  
ON THREADING CLUTCH  
  
NOTCHES DENOTE  
oun pear LEFT HAND THREAD  
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INTERMEDIATE GEAR  
  
LINK END  
LH  
  
THREADING  
SPINDLE  
  
LINK END  
RH.  
  
CLAMPING  
RING

## Page 38

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TOOL ARM NUT TOOL ARM NUT TOOL ARM  
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CLOSING  
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t  
LOCATING  
OPENING WORM  
WORM WHEEL cAM

## Page 39

rotation of the front cam shaft and the rise on the cam. Motion is  
transferred through the cam lever to the adjustable block and turn-  
buckle. The adjustable block is retained by a "T" bolt and is  
adjusted from .8 to 1.2 of the cam rise. This applies to all but  
  
the third position cam lever which has an adjustment of .9 to l.l.  
To adjust the tool post longitudinally loosen the 3/8 nut on top of  
the tool post. The tool post adjusting screw (714) has a 16 pitch  
thread, therefore, by turning the screw one complete turn you have  
moved the tool post 1/16 of an inch. Hence, every quarter of a turn  
will be 1/64 of an inch. To remove the taper from the cutting tool  
turn the tool post eccentric (715). You must first loosen the 837  
square head screw that binds the tool post eccentric. When all your  
adjustments are done, again tighten down the 3/8 hexagon nut on top  
of the tool post.  
  
To adjust the circular tools loosen the 7/16 bolt slightly to  
take its pressure from the circular tool clamp (719) from the tool.  
The tool is now free to move, by turning the circular tool adjusting  
worm (713-2) rear tool arm, (713-1) front tool arm, (713-3) front and  
rear tool posts. Now bring the tool against the setting gauge. Always  
turn the screw in the direction that will be putting thrust against the  
cutting tool, to eliminate any backlash. To adjust the swing arms out  
or away from the work spindles loosen tool arm nut thin (687-2). On  
tool arm stud (627) there are two 16 pitch threads, therefore, every  
1/16 of an inch movement there will be one complete revolution of the  
nut. Now to move the tool out 1/16 of an inch we would loosen nut  
(687-2) one complete revolution then turn nut (687-1) one complete  
‘revolution snugging against the cap. Now loosen the square head screw  
that binds the front and rear tool arm hexagon screw (459-HS). Unscrew  
this so that you will be putting a slight drag on the tool arm thrust  
plug (5080-13-P). To move the swing arms in, just reverse this pro-  
cedure. The fourth position cross slide attachment may be purchased  
as extra equipment. This is used whenever an extra forming or other  
cross slide operation is required. The tool seat on this attachment  
is approximately 1/16 from collet face when figuring a job the other  
tools must be figured from this position. A special fourth postiion  
adjustable cross slide attachment can also be purchased. The slide  
is mounted in the fourth position the same as above except that the  
tool holder portion is adjustable for ease in lining up the tooling.  
This attachment is recommended for light cutting only. Independent  
adjustable compensating stops are mounted in the tool post stop (2186).  
These are used to tension slides and the swing arm in the lst, 2nd,  
3rd, and 4th positions. NOTE - The slides and swing arm are adjusted  
by means of a turnbuckle. The turnbuckle consists of two cam lever  
links (794-R, right hand and 794-L, left hand) and a cam lever link  
nut (680). The cam lever links have a 24 pitch thread, therefore, one  
revolution of the nut would be .083 or one flat would be approximately  
~014.  
  
Gibs on the front and rear cross slides should be adjusted at  
least once a week when new, to remove looseness in the slides, as  
loose slides tend to vibrate and cause undue wear, reducing the life  
of the slides as much as 1/10 of their normal life. A loose slide  
also affects the finish and accuracy of the work. Cross slides should  
also be removed and throughly cleaned about once a month. The cross  
slides have replaceable bases securely attached to the bed, the cross  
slide ways are never uncovered.  
  
Page 41

## Page 40

Zp obeg  
  
FRONT  
TOOL ARM  
  
TOOL ARM  
THRUST PLUG  
  
FRONT  
CROSS SLIDE  
  
FRONT  
COLLAR SCREW  
  
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REAR  
TOOL ARM  
  
TOOL POST  
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TOOL CLAMP  
  
TOOL POST  
ECCENTRIC  
  
REAR  
CROSS SLIDE  
  
BINDING SCREW  
  
CIRCULAR TOOL  
ADJUSTING WORM

## Page 41

INDEPENDENT  
STOPS  
  
ADJUSTABLE  
INDEPENDENT  
  
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## Page 42

Pr ebeg  
  
HARDENED  
WEAR  
STRIPS  
  
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SECTION A’ -A '  
  
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Snes |  
  
836-4 |  
  
10-32 X vr)  
  
FLAT HEAD SOCKET  
CAP SCREW

## Page 43

Sp abeg  
  
SCREWS IN HIGH SPEED  
CLUTCH LEVER  
  
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HIGH  
FULCRUM cHUCK CLUTCH  
SPEED LEVER ADJUSTING are  
CLUTCH SLEEVE NUT

## Page 44

97 abed  
  
BRAKE  
SHOE  
  
FULCRUM  
PIN  
  
LEVER  
  
PIN  
  
CLEVIS  
  
FULCRUM  
PIN

## Page 45

We now stock hardened wear strips that can be installed should  
the slides and machine bed become gauled from misadjustment. The  
front cross slide is adjusted by loosening the inboard screw on the  
front cross slide base. Advance the gib to adjust for wear with the  
screw in the front of base, now bring the inboard screw against the  
end of the gib and the rotation of this collar screw will bring the  
gib down against the bottom of the base. NOTE - Always adjust inboard  
screw last on the first position slide.  
  
The rear cross slide is adjusted by loosening the inboard screw,  
advance the gib to adjust for wear with the screw in the rear of the  
base. Now bring inboard screw touching end of gib. Tighten rear  
screw, the rotation of this collar screw will bring the gib down  
against the bottom of the base. NOTE - Always adjust rear screw last  
on the 2nd position slide.  
  
CLUTCHES  
  
The starting clutch and the high speed clutch at the rear of the  
machine are both single plate friction clutches. The clutches must  
be kept tight enough to just carry the load without slipping. Each  
clutch is easily adjusted by a single nut. If both friction clutches  
are adjusted right and the cycle time is too slow, check the motor  
speed and see if the drive shaft is running the proper speed. Most  
frequently it is the result of improper adjustment of the screws in  
the high speed clutch fork lever (5080-77). By adjusting these screws  
it changes the position of the high speed clutch lever (5080-76).  
This lever moves the clutch in and out, make certain that the screws  
are properly adjusted, so the clutch goes in as fast as possible with-  
out the chuck lever sleeve, (637-1) hitting the chuck lever fulcrum  
(635NK). When the clutch is engaged, the chuck lever sleeve should  
be approximately 1/64" from hitting the fulcrum. Carefully adjust  
the screws on the yoke so that the clutch shifts out of low at 50  
hundredths on the cam, this should pick up the time. This loss of  
time is a tremendous waste, simply loosing time in the idle portion  
of the cycle.  
  
THE REAR WORM WHEEL BRAKE ASSEMBLY  
  
The brake assembly is mounted on the tool spindle cam shaft  
(5080-22-10). It consists of a cast iron brake drum (5080-187-47).  
This is keyed to the tool spindle cam shaft. There is a groove in  
the middle of the brake drum to accept the roll (760). A bolt (5080-  
187-58) is inserted into the cast iron drum and through the roll.  
There are eight holes in the cast drum to give you eight various  
locations to put the roll in for braking. Around the outside of the  
drum is a bronze brake shoe (5080-187-57). Resting on top of the  
brake shoe or cradle portion is a pin (5080-107-52) for the clevis.  
Through these two parts is inserted the clevis (5080-187-53). A lever  
(5080-187-54) is attached to the lower half of the brake shoe by a  
fulcrum pin. There is also a fulcrum pin in the lower half of the  
clevis. When the brake drum rotates, the roll comes in contact with  
this lever and activates the brake. Therefore, the brake is on only  
momentarily. (45° or 12-1/2 hundredths of the cam.) It is nota  
constant brake as has been done in the past. To set the brake, the  
cap screw that attaches it to the bed should have a 1/32 clearance  
  
Page 47

## Page 46

8p obea  
  
FEED TUBE CHUCK CHUCK CHUCK THRUST SCREWS FRONT SPINDLE FRONT  
ASSEMBLY ADJUSTING NUT LEVER LEVER BEARING BEARING BEARING HOUSING  
EXTENSION NUT  
  
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~<— CHUCK OPEN  
STOCK CHUCK CHUCK CLOSED ——» OUTER FEED FRONT  
ALIGNING ADJUSTING SPINDLE TUBE BEARING  
BUSHING NUT REGULAR  
  
SAQA F RRS  
  
Lp Mer ear adoron  
I /  
  
OVERSIZE

## Page 47

and the clutch nut below should also have a 1/32 clearance, thus  
allowing it to float 1/16 of an inch. If we have special cams on the  
machine that are dropping off simultaneously causing the machine to  
gallop, it is well to add an additional roll to the brake drum. This  
will retard the motion of the tool spindle cam shaft. If the holes  
in the brake drum are not in the desired position, this drum can be  
turned over so a new series of holes will be presented.  
  
REPLACE WORK SPINDLE BEARINGS  
  
To replace the work spindle bronze bearings and work head  
spindles with new bronze bearings and spindles; first remove all  
the stock from the collets (chucks). Then remove the spindle change  
gears, next remove the tool spindle and the front and rear bearings  
in the stationary head in the fourth position. In the revolving  
head, remove feed tube retaining cam (126). Move the chuck slide back  
by hand to open the collet (chuck). This method applies to the lever  
chucking or the ball chucking. Remove the feed tube in the fourth  
position, use collet (chuck) wrench and remove collet (chuck) in the  
fourth position, then clean with boiler brush and OSHA approved sol-  
vent. Remove three screws (767) in work spindle gear (946). Index  
work head and repeat the same procedure for the remaining spindles  
to be replaced. To remove the spindle bronze bearings and housing,  
remove the five hollow hexagon cap screws (834-A) in the tool post  
stop (2186) and slide the tool post stop toward the stationary head.  
If the machine is equipped with spindle stopping, unscrew center nut  
(2496-4-5) and proceed as above. Unscrew the spindle front nut (MH-  
100-3), then remove spindle, and front bearing housing with worn  
bearing. Insert new bearing and housing, then replace new spindle  
and tighten the spindle housing front nut. Index work head to the  
next position and repeat the above operations until all bearings,  
housings, and spindles to be replaced are installed. Now slide the  
tool post stop (2186) toward the revolving head and fasten in place  
with five hollow hexagon cap screws. (If there is spindle stopping  
on the machine the center nut must be tightened).  
  
The spindle gear (946) is next assembled with three screws (767)  
attaching it to the spindle, index work head and repeat operation  
until all gears are installed.  
  
For running in the bearing, run the machine with the work head  
indexing. The spindle bearings get lubricated one at a time while  
in the fourth position ONLY. If the work head does not index, then  
only one bearing is being lubricated. When bearings are replaced  
the machine should be slowed to 750 R.P.M. and use the same procedure  
as breaking in a new machine. A machine equipped with roller bearings  
(MH-100-27-SA) or changing a machine with bronze bearings to roller  
bearings, use the same procedure to remove the spindle as above, then  
remove the outer race, or bronze bearing. Now to install the new  
needle bearings, make sure the outer race and the inner race on the  
spindle to be installed are matched as they come from the factory.  
Be sure to change the lubricator meter to CJB4. Under no circumstances  
interchange sleeves and outer races. Spindles having bronze bearing  
can be converted to needle roller bearing spindles at Davenport  
Machine Tool Division. NOTE - These spindles must be ground for the  
inner race.  
  
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## Page 48

RETAINING CHUCK THRUST SPINDLE  
  
CAM SLIDE BEARING GEAR  
CHUCK  
FEED TUBE CHUCK LEVER SPINDLE FRONT  
ASSEMBLY LEVER EXTENSIONS BEARING NUT  
  
SPINDLE FRONT  
BEARING HOUSING  
  
WORK  
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THRUST SCREW mt TAN}  
  
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BEARINGS  
  
LOCKING NUT WZ  
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## Page 49

NEEDLE  
  
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## Page 50

NEEDLE BEARING  
  
OUTER SPINDLE  
NEEDLE  
  
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## Page 51

Install the outer race first, then push the tool post stop (2186)  
into place, making sure that one tool post stop eccentric from each  
spindle enters the notch in the flange of the outer race. Next replace  
the five hollow hexagon cap screws securing the tool post to the  
revolving head. Next step, insert an 836-A #10-32 x 3/8 screw into  
the threaded hole. Bring down snug against the housing to prevent  
the bearing from chugging. Back screw off 1/6 of a turn as too much  
pressure will distort the bearing cage. Use an 836-A #10-32 x 3/8  
screw to lock this screw.  
  
To install a new bearing on an old spindle, remove the inner  
sleeve from the spindle; the sleeve is removed by applying a flame  
to the sleeve only. It should expand and slide off. The inner sleeve  
of the new bearing should be put in a controlled electric oven and  
heated between 150°F to 170°F then very quickly be pushed by hand over  
the spindle to within approximately 3/32 from the spindle nose. If  
the sleeve closes on the 1.6725 diameter do not pound with a hammer,  
use a steel washer and very carefully push with arbor press to position.  
The end of the sleeve to the hub on the spindle nose should be approx-  
imately 3/32. NOTE - Machines being rebuilt with needle bearings do  
not have to be run in. But, the head must be indexed to lubricate  
these bearings.  
  
LUBRICATION  
  
Lubricating the machine is done with the Automatic Lubricating  
Unit and an oil gun. NOTE - The gun supplied is an oil gun, not a  
grease gun. CAUTION - Do not grease any of the fittings on the  
machine, use oil of the same grade used in the lubricator. Use a  
good grade of SAE #20W. In climates of extreme heat, 85°F or more,  
use SAE #30W. All the oil fittings should be serviced before starting  
the machine to run daily. The machine must be indexed a minimum of  
five times to insure oil to reach the bearings on the work spindle,  
as the work spindle is only lubricated in the fourth position. On  
new machines, this bearing is lubricated from a constant flow line,  
on the old machines, the spindle was on a cyclic line, and the flush  
button on the lubricator must be depressed. CAUTION - Do not run the  
machine if the low pressure gauge reads less than five pounds, the  
high pressure gauge less than fifty pounds. The system is a Dual-  
Purpose Lubricator. High pressure periodically forces a measured  
volume of oil through a cyclic line (copper or brass) and a constant  
flow of oil through a low pressure line (chrome plated). The lubri-  
cator is driven by a pulley on the Drive Shaft to a pulley on the  
Lubricator. On the 75 cycle machine with the Drive Shaft 1501 R.P.M.  
the pump shaft will run 1007 R.P.M. On a 60 cycle machine drive  
shafts 1217 R.P.M. the pump shaft will run 817 R.P.M. Ona 45 cycle  
machine with the drive shaft 933 R.P.M. the pump shaft will run 626  
R.P.M. It is recommended if the machine is going to be run for an  
extensive length of time at a cycle other than 75 cycle, that another  
pump pulley be purchased to have the pump run approximately 1000 R.P.M.  
NOTE - If there is too little oil at the bearings on the cyclic line  
check for low oil level, broken or cracked lines, loose connections,  
flattened lubrication outlet lines or clogged filter. If all is  
  
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## Page 52

Low Pressure  
(Constant)  
ibs.  
  
Bijur\_ Lubricator  
TYPE ~ APE -L3  
‘SER- NE  
  
6 Pint Con.  
  
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High Pressure BEARINGS FOR -  
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5 Way 8-3263  
  
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Ring Gear Back.  
Spindle Bearing,  
  
inside Revolving Head Cap-  
3 Way 8-306  
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Use CuB-4  
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Use CJB-4,  
Sondie Thrust Brg  
Use CJB-2  
  
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12 Wav Double 68-3249  
Inside Of Bed Under Stotionare Head-  
All Spindles Stationary Head  
  
Burring Slide,  
Bronze Bearings  
  
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NOTE! On Both High & Low Pressure  
41 Lines From Junction To Junction = .106 1.0,  
2) Lines From Meter Units To Bearings = 046 LD.  
  
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G ° Ld ’. a  
  
Adopter Sleeve Bushing Plva | Nut  
2446-36 2446-32 2446-34 2446-35 244633

## Page 53

satisfactory and machine is running at operating temperature, increase  
the oil feed. Carefully disconnect the drive discharge lines and  
remove lubricator from resevoir. NOTE - Index whole number on cam on  
which locating pin is engaged, pull out knurled knob and rotate until  
locating pin enters index hole with next higher number. Too little  
oil at the continuous line bearings, same inspection procedure as  
above. If everything is satisfactory, turn continuous bypass valve  
adjustment clockwise with result in increase in the oil pressure while  
machine is in operation until proper oil flow is achieved. Too much  
oil at bearings in either line, continuous or cyclic, procedures  
  
would be reverse of those described above. For too little or too much  
oil at one bearing only, meter units of same type but next higher or  
lower flow rate should be used. The cyclic bypass valve adjustment  
  
is under the name plate, continuous bypass valve adjustment in under  
the cone-shaped nut.  
  
Oil the machine daily using flush button when starting up the  
machine. Also use the oil gun to oil all fittings prior to starting  
up the machine. Plugs at the bottom of the worm housing should be  
removed every three months and the housing flushed out with an OSHA  
approved solvent. Replace the plugs and fill with fresh oil.  
  
TOOLING UP A NEW JOB  
  
Remove high speed pin, put machine in direct low and insert manual  
reverse for ease of set up. Then, remove the tooling and equipment  
used in the previous job. Remove all tools, backup tension screws,  
take out the feed tubes and install new feed fingers. Remove the  
collets from the spindle between the 4th and 5th position and wash  
out the spindles with an OSHA approved solvent and boiler brush after  
washing swab with lubricating oil. Now oil and insert the new collets  
(chucks) and the feed tubes. Repeat the above operation until all  
collets and feed tubes have been replaced.  
  
Insert five bars of stock in the machine and adjust all the  
collets. (Adjust the amount of stock that will be fed out by the  
crank on top of the feed slide). Remove the cam carriers and put  
on the new set in which the cams for the new job have already been  
mounted. Now locate the block on the cam levers to get the required  
amount of movement for the tools. Put on the spindle change gears  
and the feed gears. Now index the machine manually to be sure all  
components are working freely. The machine is now ready for tooling  
which should be correctly sharpened before starting to set up the  
machine.  
  
First, put in the cutoff tool and adjust approximately 1/16"  
away from the face of the collet. Cutoff the end of the bar by  
operating the cutoff tool by hand. Open the collet and feed out  
the stock the length needed for the job. Close the collet by hand  
and cut a slight groove in the stock. Withdraw the latch (5161-1)  
on the top of the collet opening lever so the stock will not be fed  
out in any of the spindles as the work spindle head is indexed. In  
the first position, mount the tool holder for the first position in  
place. Index the spindle carrier until the stock comes in line with  
the stock stop face of the tool holder. (Approximately 1/2 Index).  
  
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## Page 54

Adjust the stock stop screw (888-1) on the right hand end of the  
tool spindle, adjust until the face of the holder comes in contact  
with the stock. Now, index and lock the spindle carrier. Try the  
first tool by hand with the hand lever (5080-146) and adjust the  
tool to cut the correct size. Turn the handwheel until the roll  
  
of the cam lever is at the highest point of the cam. Now adjust  
the turnbuckle link connection with the cam lever so the tool is  
fed to the correct dimension. Index the spindle carrier to the next  
position, with the next tool holder use the Same procedure as des-  
cribed above. When using a forming tool, adjust the forming tool  
to the correct height to the center of the work. Line it up with  
the groove already cut in the work Piece by the cutoff tool. When  
the roll on the cam is at the highest point of the cam, adjust the  
turnbuckle connection so as to cut .010 smaller than the required  
size. Adjust the cross slide stop screw until it comes in contact  
with a .005 feeler gauge placed between the tension screw and the  
stop screw in the spindle carrier. Turning the tension screw 1/4  
turn will give approximately .005 pressure to insure forming the  
same size on all spindles. Mount the balance of tools, index the  
Spindle carrier to the next position and mount the next tool as  
described above. Repeat this operation until all tools are in place.  
Now engage latch (5161-1) to feed stock, before beginning to run  
the job check the piece of work from each spindle. Make any adjust-  
ments as needed.  
  
CHANGING THE COLLETS (CHUCKS)  
  
The machine is -indexed to fifth position, to approximately 96  
hundredths, shut the machine off. The machine should be in a position  
where the cutoff tool is clear of the stock just after the head locks.  
Loosen the set screw locking the stock reel. Back the stock reel  
tubes away. Raise the feed slide guide latch (5165). Withdraw the  
pusher tube unit toward the stock reel. Handle this unit very care-  
fully. Remove any tool holders if it would obstruct withdrawl of the  
collet. Raise the chuck lever roll throwout (5080-292-3) from engage-  
ment of the cam race. Now insert the cam lever handle (5080-146) into  
the chuck opening cam lever (5017-1) and manually open the collet.  
  
Now manually crank (use handwheel) the machine back to approximately  
1/2 index. Remove the upper rear guard (MB-387-1) on the rear of  
  
the machine. Lock the spindles by placing a brass rod between the  
spindle gears. Insert the chuck wrench into the inner spindle to  
  
the first mark on the wrench. Rotate the wrench clockwise or counter-  
clockwise at the same time pushing on the pin at the end of the  
pusher rod until the pins in the wrench enter the holes in the collet.  
Insert the cam lever handle (5080-146) into the knurled collar on the  
end of the wrench. Turning the handle clockwise will unscrew the  
collet (the collet has a right hand thread). Clean inside of inner  
spindle and outer spindle with an OSHA approved boiler brush and OSHA  
approved solvent then swab with lubricating oil. Select collet for  
next job. Remove all burrs, if any, from the inside of the collet.  
Wipe all threads and lubricate with oil. Insert the collet and screw  
up tight. Tighten with collet wrench and remove the collet wrench.  
NOTE ~ There are two collet wrenches. One for oversize (2816-45-SA),  
and one for regular (2816-41-SA). Manually crank (use handwheel)  
  
Dana SA

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## Page 58

the machine back to fifth position to replace the feed tube pusher.  
Use feed tube wrench block (848-W) and hold in a vice so that the  
desired feed tube hole is exposed. Turn the feed tube so that the  
  
key fits into the slot in the wrench block. Tighten the vice. Take  
the feed finger wrench (848-3) and place over the feed finger. Take  
  
a 5/32 hexagon set screw wrench and put through the feed finger wrench  
and the feed finger. Now remove the feed finger. There is also a  
right hand thread on the feed finger. Wipe off and oil the feed  
finger tube unit, insert the new feed finger and again tighten with  
the feed finger wrench. Return the feed finger tube unit into the  
machine, and release the feed slide guide latch (5165). Using the  
short sample bar ends, adjust the collet tension with the chuck  
adjusting nut. Insert the cam lever handle (5080-146) into the chuck  
opening cam lever (5017-1). Open and close the collet against the  
stock to get the feel of the correct tension. When the correct tension  
has been maintained, lock the chuck adjusting nut. CAUTION - Collet  
(chuck) and chuck lever breakage is caused by improper tension. Use  
extreme care. Index the next spindle and repeat above. After assembl-  
ing all collets replace stock reel tubes in proper location. Lock  
stock reel with set screw and replace chuck lever roll throwout (5080-  
292-3).  
  
SETTING THE STOCK STOP  
NOTE - The machine is still in direct low speed.  
  
METHOD #1 - Stop the machine in loading position #5. (Approximate-  
ly 55 hundredths). When cutoff tool withdraws enough to clear the  
stock before the head unlocks, raise the knurl knob on feed lever  
(5016) to free fee@ lever throwout (5174) and Withdraw from cam race.  
Put cam lever handle (5080-146) into the feed lever (5016), push the  
feed lever to the extreme left. Now open the collet by hand. After  
the collet is open feed the stock by hand. Move the feed lever as  
far right as necessary to feed the length of the piece required.  
Measurement for the correct length of piece should be as follows:  
Length of piece plus some amount for facing. Putting your scale  
against the face of the cutoff tool which is toward the stationary  
head, move the stock to a predetermined place on the scale. Close  
the collet by hand, disengage chuck slide opening guide latch (5161-1)  
index the machine halfway until the piece comes in line with the stock  
stop plate. Loosen the binding screw in the bed which binds the stock  
stop screw (888-1). Turn the stock stop screw, moving the first  
position spindle until the stock stop plate is firmly against the end  
of the piece. CAUTION - Under no circumstances do you use the turn-  
buckle connection to adjust this. Raise the knurl knob on feed lever  
(5016). Moving the lever by hand, line up the roll, insert the feed  
lever roll throwout in the cam race. Manually backup the machine  
until feed tube is fully withdrawn (61 Hundredths). Loosen the  
binding screw locking the feed screw crank handle (7186-1). Adjust  
now for the stock feed out. Turn the crank on the feed slide. The  
amount the feed slide moves can be measured between the steel washer  
on the feed tube and the end of the inner spindle. This distance is  
the length of the piece, plus the cutoff. All this plus approximately  
1/4" extra feed is to take care of the backlash in the feeding mechan-  
ism.  
  
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cedure for all spindles. Replace chuck lever roll throwout (5080-292-3)  
in chuck and feed cam and remove cam lever handle (5080-146). CAUTION  
When ejecting bar ends make sure they do not drop in such a way that  
they may cause a jam up or damage the tooling, ie, falling on the front  
or rear slide and jamming between that slide and a spindle.  
  
ELECTRICAL CONTROLS  
  
The control box line and ground wire connections are made inside the main control box. Breaker switches (usually a handle) provide a cut off of all electrical current to the machine. A set of heaters or other safety devices are incorporated to prevent overheating the motor. The heaters are a sensing device used to detect overheating and overloading the motor. A reset button is triggered when over- loading or overheating occurs. Reset release cuts off the power  
source to the motor. CAUTION - This condition usually occurs when  
the machine is operating under power or feed. The feed start and  
stop handle must be on the stop side and/or clutch disengaged before  
resetting. If overload is caused by an obstruction the source must  
be located and removed before starting the machine.  
  
START AND STOP BUTTON  
  
The main motor drive is usually controlled by a start and stop  
button. An inch or jog button is incorporated in this control which  
is used primarily for set up work and stocking up the machine.  
  
—oO  
220 VOLTS  
  
or —O  
  
44 O  
O VOLTS ) OO fT  
  
FUSES  
  
HEATER  
  
TRANSFORMER  
  
|  
  
SPECIAL FUSE  
  
EXAMPLE SETUP OF MOTOR, FUSES AND HEATERS  
  
MOTOR-7'72 H.P. 1745 R.P.M.  
RUNNING LOAD 22 AMPS  
  
STARTER BOX- NEMA SIZE 2 COMBINATION  
MAGNETIC STARTER  
  
FUSE SIZE FOR - 220V (30 AMP) OR 440V (17 AMP)  
(DUAL ELEMENT TIME DELAY FUSE)  
  
HEATER FOR- 220V OR 440V  
  
STOP L START  
al. O o NOTES -  
  
1) FUSE AND HEATER SIZE WILL CHANGE  
WITH H.P, AND OUTPUT OF MOTOR  
2) HEATERS, START BOXES AND MOTORS  
Jos RUN MUST BE MATCHED AS IN THE ABOVE  
) EXAMPLE THEY ARE NOT INTERCHANGE-  
  
LIMITER GROUND ==  
SWITCH  
  
ABLE.  
  
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## Page 60

HOLE & 0.0, MUST BE CONCENTRIC  
WITHIN .0002 TOTAL INDICATOR READING  
  
38  
SIZE TOOL ROLL  
  
3RD POS. Ts  
1 REQ'D  
  
1.9863  
CIRCULAR FORM TOOL  
  
T-15 PM H.S.S.  
HDN.-Re 64-66  
  
MAT'L.- T-I5 PM H.S.S.  
HON. Re 64-66  
  
112s  
  
on  
  
‘4  
  
1850  
  
DOVETAIL FORM TOOL  
  
MAT'L.- CARBIDE INSERT  
GRADE C-2  
  
FORM & CUT OFF TOOLS 1/¢" BELOW CENTER  
  
‘SW TOOLS 1/2" BELOW CENTER cours  
  
ROCHESTER, W.¥.. U.S.A.  
  
\*  
  
“4-28 NF TAP  
  
Tea DIA. ORILL  
  
By xy x i'g  
  
CARBIDE INSERT  
  
waren nceens Test ov. -  
ortarriead mae ait am ero] OOF |  
  
Page 62  
  
x  
% 74!  
[ 8 J | S48  
90° \_&  
SPIRAL RELIEVE  
8° LEFT HAND  
  
SPECIAL \_L.H. CENTER DRILL  
—S—S EEE  
  
STH POS. MAT'L - 1.5.5,  
| REQ'O HDN,- Re 60-65  
  
SPIRAL RELIEVI  
RIGHT HAND  
  
SPECIAL CENTER DRILL  
1ST POS MAT'L- EXT MACHINING ON  
1 REQ'D 7 COMBINATION ORILL &  
COUNTER SINK  
  
1%  
76  
es es  
i} 5 nH”  
yeep A AN  
%o  
GRIND OFF .010  
. AFTER FINISHING  
1495 O1A. # DIA'S. MUST BE HOLE  
  
CONCENTRIC  
  
SPECIAL DRH.L\_ BUSHING  
——— SEE  
  
3RD POS. MAT'L- AIS! 12113  
1 REQ'D CASE HDN.-.010 Re 68-71  
\  
  
iv 5 @  
+  
  
SPECIAL CUTOFF \_BLADE\_  
  
STH POS. T-5  
(| REQ'D Re 63-67  
  
ENPORT INSTRUCTION  
BOOK LAYOUT

## Page 61

maton Sg ROUND 12L14 1810 ouas 35-29 .  
resvatan 50 (60 IDLER) atars 32-32 woo B WITH THREAOING  
  
[eeu | St RSP CESS] roo momen  
  
5-16 ROUND COLLETS  
5-916 FEED FINGERS  
1+ 2904-10-SA STOCK STOP  
\- 27I7-SA ADJ. DRILL HOLDER  
|- SPECIAL TST POSITION  
CENTER ORILL  
{~ 3060-I-|-SA\_ DOVETAIL  
FORM TOOL HOLDER  
I- IST POSITION DOVETAIL  
FORM TOOL  
2-2714-SA REVOLVING ORILL  
HOLDER  
2-#25 (1495) DIA, DRILL HS.5  
REVOLVE DRILL 2 TO! 1232-98-70-SA 1 1601 DRILL BUSHING WITH  
4495 DIA. HOLE  
'- 2ND POSITION CIRCULAR  
FORM TOOL  
1- 3RD POSITION SPECIAL  
ORILL BUSHING  
(- SPECIAL DRILL CAM C-2255:  
ty 2726-0-SA OVERSIZE SIZIN  
TOOL WITH 774" PLATE  
|- SIZING TOOL & ROLL  
1- 2747-C TAP HOLOER  
1+ 10-24-NC TAP  
|- (801 TAP BUSHING  
\- 2768-SA CUTOFF BLADE  
HOLDER  
t+ SPECIAL CUTOFF BLADE  
{- 1263-5-10-SA STATIONARY  
HEAO BURRING ATTACH  
STATIONARY HEAD BURRING ATTACHMENT I- 646-23-1 3/8 ROUND  
1263-5-10-SA BURRING CHUCK  
CO'SINK ARM ATTACHMENT 1263-119-1-SA SPECIAL BURRING CAM  
5-C-1488 5-C-1510-1  
I+ 1263-119-1-SA OOUNTER -  
SINK ARM & STOP ATTACH.  
I- SPECIAL LEFT HAND  
CENTER ORILL  
SPECIAL SWING ARM CAM  
5-C-1488  
  
“Ol  
25-.1495 DIA. DRILL THROUGH  
90° CO'SINK '/35 DEEP  
  
GAVENPORT MACHINE TOOL BEV. | wank au TooLs AU.L-LO-i DAVENPORT INSTRUCTION  
LNZD cearenanien  
AROCHESTEA, WY. U.B.A. DRAWN BYA.J.L. DATE 6-17-80 BOOK OUT  
  
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LAYING OUT A NEW JOB  
  
We show two layouts of tool equipment, feeds, speeds, and production. One made from steel and the other from brass. If the description on these two layouts is followed carefully, it should enable your production man, foreman, or operator to easily tool up for an ordinary piece. Brass, aluminum, and leaded steel are usually run at a higher spindle speed except when using the 2:1 (brass) threading method. Then, the maximum work spindle speed of 2500 R.P.M. is recommended. The 6:1 (steel) threading method can be used for speeds in excess of 2500 R.P.M. NOTE - Only run the machine at the spindle speed needed to do the job, excessive revolutions only laps the tools away and causes more wear on the work spindle bearings. For steel work, the surface feet depends on the nature of the piece and the operations to be performed. Usually 165 to 280 surface feet for free cutting cold rolled steel and leaded stock. 50 to 80 surface feet for tool steel. A good idea of feeds and speeds of various tools can be formed by consulting almost any mechanical hand- book or data machining handbook furnished by the mills. In our charts you will find a table of stocks and their resultant surface feet.  
  
The spindle speed gears can now be selected. In our charts is also a table for time cycles and the proper feed change gear. By using these two tables you can easily determine all the speeds and feeds required for any job ranging from the slowest to the fastest, on the 75, 60, or 45 cycle machine. Determine the longest operation. When possible, divide into two or more operations. Divide the length of feed required on the longest operation by the feed per revolution. This will give you the number of effective revolutions required. After finding the number of effective revolu-  
tions required for the longest operation, consult the charts. In the column of the determined spindle speeds select the number nearest the number of effective revolutions needed. Follow along this line to the left and find the number of seconds required to make the piece, the gross production per hour and also the feed gears to be used.  
  
If the piece is to be threaded with tap or solid die, the correct cam to be used, and location of the block on the cam lever can be found in the threading tables. Read the instructions on the threading attachment for an explanation of when and how to use the various threading methods.  
  
On the preceeding page is a tool layout for a steel bushing. After consulting a data machining handbook for speeds and feeds and from the nature of the operations to be performed it was decided to use 270 surface feet for 9/16 diameter stock grade 12L14. We find 267 surface feet to be the closest in our chart. By following across the page to the left we find the spindle speed to be 1810 R.P.M. The spindle change gears to be a 35 tooth driver, and a 29 tooth driven gear. After looking at this job to determine the longest operation we find that we can divide the forming into the first and second positions. The drilling can be divided in the second and third positions with a half to one revolving drill, and it would take 6 revolutions for every thread in the piece, there being 3/8 of thread in the piece at 24 pitch(.375 x 24 = 9) Threads would mean there would be 9 full threads in the piece and 3 extra revolutions for lead for a total of 12 threading revolutions. Therefore, we would need the minimum of 72 revolutions in the working portion of the cam which would be from "0" to "50". Further looking at the part, we find the counterbore in the front would need .125 plus .104 for the drill point for a total of .229 feed. We can feed this drill .005 per revolution so 46 revolutions would be needed. The next two drill positions would have to drill the remainder which is .588 divided by 2 (2nd and 3rd position drills) equals .294 plus .010 for pressure and approach equals .304. With a feed of .0035 we need 87 revolutions. Since the tool spindles rotate 30 revolutions (approximately 1/2 the revolutions of the work spindles) in the opposite direction, the work spindles would have 57 effective revolutions. 30 revolutions plus 57 effective revolutions equals 87 revolutions. This completes the end working operations. The forming can be done in the first and second position. We will be forming from .562 stock diameter to .296 diameter. The .296 @iameter is obtained by using the .310 finished diameter minus .005 chamfer on piece minus .002 past into the cutoff. This would then be .005 plus .002 equals .007 x 2 both sides diameter equals .014. .310 minus .014 equals .296. Now .562 minus .296 equals .266, this divided by 2 (first and second position form) equals .133. Since .133 equals the diameter it is divided by 2 to find the rise needed on the cam, .0665 is the amount of rise needed. A feed of .0025 can be used for a total of 27 revolutions. Next to figure the cutoff .300 diameter plus .010 (.005 past center) equals .310. This divided by 2 equals .155 divide by .0025 feed per revolution equals 62 revolutions needed. The hole in the part goes into the cutoff, but not into the next part. This allows the part to be cut off at approximately 22 hundredths. The hole in the part is .150 diameter. This from the .300 outside diameter leaves .150 (double wall thickness). This dimension divided by 2 actual wall thickness one side .075. Using a standard 5/32 form and cutoff can (5-C-11) the rise is from 0-45. 5/32 divided by 45 hundredths equals .0035 per hundredth, .0035 divided into the .075 wall thickness gives us 21.4 hundredths (round this off to 22 hundredths). Using this standard cam the piece is now cutoff, and  
remainder of the cam rise continues to clean off the bar end. It will take approximately 28 hundredths after part has been cutoff to drop back, have countersink arm swing down and countersink. After all these calculations, the threading is found to be the longest operation with 72 revolutions from 0-50.  
  
To find cycle time take 1810 R.P.M. divide this by 60 seconds. This equals 30.167 revolutions per second. 30.167 divided into 72 equals 2.386. Round this off to 2.4 and add .4 for index time giving a total time of 2.8 per piece. 1810 RPM 60 seconds = 30.167 R.P.S. 72 Revolutions needed 30.167 R.P.S. = 2.386 Working Time 2.386 Seconds Working Time +.4 Second Index Time 2.786 Total Time 2.8 Seconds Rounded Off  
  
We see that it has a time cycle of 2.8 with a 50 tooth gear as the driver, driving a 60 tooth idler gear and this in turn drives an 80 tooth driven gear. Now to proceed with the tooling for this job. In the first position use stock stop 2904-10-SA and adjustable drill holder 2717-Sa. Into the drill holder we put a combination lathe center. This center has a 5/8" body and 1/4" drill. Rework the center making two tools from one lathe center. The reason this was used, it will break the edge of the hole to remove the burr while the form tool is facing the  
end. In the first position we rough form with holder (3060-1-1-SA) and carbide dovetail tool, the carbide dovetail tool was chosen because we will only be penetrating the skin when forming out the .544 diameter. Second position revolve drill 1/2 to 1 and use 2714-SA  
drill holder with a #25 (.1495) drill and drill bushing. This drills  
1/2 the depth of the .1495 diameter hole. The second position circ-  
ular form tool forms the diameters to within .004 of the finished  
‘part. Third position revolve drill 1/2 to 1 and use 2714-SA drill  
holder with a #25 (.1495) drill and special ddrill bushing. Drill the  
remainder of the depth of the .1495 diameter hole. The third position  
sizing tool holder 2726-0-SA with a circualr sizing tool and roll are  
used to bring the diameters and widths to the correct dimensions.  
  
In the fourth position use tap holder 2747-C-SA and a #10-24 N.C.-2  
tap and bushing.  
  
NOTE - Most taps have low cutting edges and should be fluted out before  
using. Fluting out a tap can be done with a mounted grinding wheel  
held in either an air or electric drill. The reason for fluting is to  
eliminate the low cutting edges produced when the thread is ground.  
NOTE - Form tools will also have low cutting edges unless ground with  
  
a cupped wheel. Fifth position blade tool holder 2768-SA and 3/32"  
wide cutoff blade, ground 1/16" wide, back 5/32" and off on a 45  
  
angle. This gives us the maximum rigidity with the minimum width of  
cutoff. The left end must be countersunk. Use 1263~5-10-SA stationary  
head burring attachment to hold the part while being cutoff and count-  
ersunk.  
  
It is advantageous to use the stationary head burring attachment  
with the countersinking arm and stop attachment 1263-119-1-SA. The  
burring attachment is a revolving spindle with an independently oper-  
ated chuck in line with the work spindle in the fifth position. It  
is driven in the same direction and exactly the same speed as the work  
spindles.  
  
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Longitudinal movement of the spindle is controlled by a special  
cam mounted on the tool spindle cam carrier, in place of the cam  
ordinarily used to operate the fifth position tool spindle. The chuck  
is opened and closed by an adjustable cam on an extension of the  
regular cam carrier. To countersink the bushing, as shown, the burring  
spindle is moved forward and the chuck closed on the piece before it  
is severed from the bar. After the piece is cut off, the spindle drops  
back far enough to allow the countersink arm to swing into position,  
in front of the piece which is held in the~burring chuck. The counter-  
sink arm is also independently operated from a special cam fastened  
to the carrier which opens and closes the burring chuck. The piece is  
then moved forward into the countersink which is held stationary in the  
arm. Dropping the spindle back again allows the arm to be swung out of  
the way. The chuck is then opened and the continued backward movement  
of the spindle ejects the finished piece. NOTE - Two special cams are  
required, one for the swing arm and the other to move the burring  
spindle.  
  
After the tools and tool holders have been determined for each  
position and the rise on the cam determined for each position, select  
a cam for each operation. Choose from the list of standard cams  
which has a rise nearest the amount that the tool must be fed.  
  
Selecting the cams for this job, we would use a 1/4 drill cam  
in the first position with the block set at .96. Which would give  
a rise of .229 plus .010 for approach. The forming in the first and  
second positions requires a rise of .0665, since we want to start our  
drills first and a light feed on the tools laps the edge away, a 3/32  
rise cam has been selected. We should start our first drill in the  
first position with a point of 100 included angle. Then thin the  
point to have a minimum of thrust. In the second and third position we  
need a\_rise of .294 plus .010 for a total of .304. Use a drill point  
of 110° included in the second position and 120° included in the  
third, also thin these points. Always start a drill on the corners  
to have a true running hole, set the block location accordingly.  
  
Location of the cam lever block is found by dividing the amount  
that the tool must be fed by the rise on the cam selected. For  
example, we need .294 plus .010 equals .304 feed for each drill oper-  
ation. A 3/8 rise cam is the nearest to this, therefore, we divide  
-304 by 3/8 which equals .81 the location of the cam lever block.  
Recommended range of the block setting is from .8 to 1.2. In the  
third position we have listed a special cam to do the drilling oper-  
ation. This is necessary for the third position drill to clear on  
the index, also in this position the dropback on the cam must be less  
so the collar on the tool spindle does not come back and hit the  
bronze tool spindle bearing.  
  
CAUTION - Form and cutoff cams (6" diameter) can be used in  
place of turn and drill cams. However, turn and drill cams (7-1/2"  
diameter) cannot be used in place of form and cutoff cams.  
  
Now to determine our threading. Note the threading portion is  
.375 of an inch long with 24 pitch threads. .375 x 24 equals 9 threads  
in the piece. With 9 threads in a piece and 3 threads minimum lead it  
is a total of 12 threads and it takes 6 revolutions to cut one thread  
  
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~  
  
so therefore, we need 72 revolutions. Now to determine the cam for  
the tapping operation. 1810 R.P.M. times 32 driver divided by 32  
driven to the low side of the threading clutch gives us a 21 driver  
and a 28 driven. The resultant in speed would be 1357 now taking  
this from 1810 we get a resultant speed of 453 R.P.M., 453 revolutions  
per minute divided by 60 seconds gives us the resultant of 7.54 revo-  
lutions per second. We now have 7.54 revolutions for one second of  
the job. To determine at 2.4 seconds, (our actual working time from  
0 to 50.) Since we are only going to be using from 0 to 32-1/2 on  
the working portion of the cam, each hundredths of the cam represents  
2% of the working portion of the cam. We, therefore, have 65% from  
  
0 to 32-1/2. Now 65% of 18.10 gives us a total of 11.765 or divide  
50 into 18.1 revolutions from 0-50; this equals .362 revolutions per  
hundredths times 32.5 hundredths equals 11.765 actual revolutions  
from 0 to 32-1/2 and a pitch of 24, we divide this into the number  
  
of revolutions that we have and find that the resultant is a cam  
  
rise of .490. Looking over our steel threading cams we find that the  
#4 cam which has a rise of .452 would be the closest to our desired  
rise. Now divide .452 into the rise that we found of .490 to get the  
block setting and we find this to be 1.08. This would be an approx-  
imation of the block setting for your threading cam. The following  
is an example of the above description:  
  
1810 R.P.M. x 32 Teeth x 21 Teeth = 1357.5 R.P.M. of Threading Spindle  
1 32 Teeth 28 Teeth  
  
1810.0 R.P.M. of Work Spindle  
  
71357.5 R.P.M. of Threading Spindle  
  
452.5 Threading R.P.M.  
  
452.5 R.P.M. = 7.54 Revolutions Per Second  
60 Seconds  
  
7.54 R.P.S.  
x2.4 Seconds 0-50  
18.1 Revolutions from 0-50  
  
18.1 Revolutions from 0-50 = .362 Per One Hundredth  
50 Hundredths  
  
-362 Per One Hundredth  
x32.5 0 to 32-1/2 Tapping Portion of Cam  
11.7650 Revolutions from 0 to 32-1/2 Hundredths  
  
11.765 Revolutions from\_0 to 32-1/2 = .4902 Rise Needed  
24 Threads Pitch  
  
-4902 Rise Needed = 1.0845 Block Setting  
-452 #4 Thread Cam  
  
OR  
18.1 Revolutions from 0-50  
  
x65% Equals 0 to 32-1/2 Hundredths on Cam  
11.765 Revolutions from 0 to 32-1/2 Hundredths  
  
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SPECIAL BOX TOOL BLADE  
  
3 RD Pos, MAT'L T-IS 1.S.S.  
| ReQ'o  
  
CIRCULAR FORM TOOL  
  
2 ND POS MAT'L TIS PM H.S.S.  
| REQ'D HON. Ry, 64°66  
  
SPECIAL BOX TOOL ROLL  
  
SPECIAL BOX TOOL BLADE 3 RD POS. MAT'L-(EXT. MACH) 2784-6-1  
epos..sSsSté=<CS~Ssté‘sé«SaRAT'L ST. 2 REQ'D  
  
MAT L- T-15 H.S.S.  
  
‘coneanen MAPK ALL TOOL A.J. ne pa Sreee LO-2 DAVENPORT INSTRUCTION  
Ip  
1. MY., cone ORAwn BY | onawn ay FRAUELoate 6/16/80 | 6/16/80 BOOK LAYOUT  
  
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Pa. Oo. ouane 42°21 7!  
eave BRASS ROO wewacert.renum. 453 arms 2? 300: eveus  
ee mon rove 1S00 eespean 60 (60 IDLER) Twngan ecans 32-32 LOWSIDE wcse. "8" WITH THREADING  
  
5-42 HEXAGON CHUCKS  
623-I-1-SA\_OWL SLEEVE Sry MEXAGON CHUCKS  
srr TOC i | 1-£-2810 STOCK STOP  
ROUGH TURN  
  
1+ ADJUSTABLE HOLLOW MILL  
  
1- E-2700-4 BOX TOOL  
  
1-2ND POSITION SPECIAL  
BOX TOOL BLADE  
  
1- CIRCULAR FORM TOOL.  
  
1+ E-2785-1 BOX TOOL  
  
)- 3RD POSITION SPECIAL  
BOX TOOL BLADE  
  
2+ SPECIAL BOX TOOL ROLLS  
  
1+ 2527°SA DIE OPENING &  
CLOSING ATTACHMENT  
  
\- SELF OPENING DIE HEAD  
  
1- SET %g-20 NF -2 CHASERS  
  
1- CIRCULAR CUTOFF TOOL  
  
1 1263-8-10-SA. STATIONARY  
HEAD BURRING ATT/  
  
1+ 5-C-48-1 BURRING CAM  
  
1- €46-23-1 .310 DIAMETER  
BURRING CHUCK  
  
|- 623-1-1-SA OIL SLEEVE  
  
STATIONARY HEAD BURRING ATTACHMENT  
1263-5-10-SA  
  
Yq 20° NF-2  
  
aocem rest ere. WARK ALL TOOLE en ee DAVENPORT INSTRUCTION  
pincer} [iI conrenanen Tenawn av FRAUEL oars 6-16-00 | BOOK LAYOUT  
  
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This is a tool layout for a brass adjusting screw. As the work  
spindles are run at high speed for brass, we find in the table the  
spindle speed, 3000 R.P.M. and also the gears to use, a 42 tooth driv-  
ing a 21 tooth gear. By examining the operations to be performed, we  
find the finish turn is the longest operation. As this is to be fed  
by the feed per revolution to get the effective revolutions (13/16  
divided by .009" equals 90 effective revolutions.  
  
Repeating the procedure of the previous layout, we find the  
effective revolutions nearest to this in our charts, under the column  
"3000 R.P.M. of Spindle", which is 90. To the left of this column,  
we find the time in seconds to complete one piece of work is 2.4 sec-  
onds. The gross production is 1500 pieces per hour, and the feed gear  
has 60 teeth.  
  
Next, find the feed per revolution of the remaining operations,  
select the cams and figure the location of the blocks.  
  
A self opening die head is used to cut the thread. A detailed  
explanation of how to select the threading gears and figure the correct  
turn and drill cam to use will be found under the title, "Self Opening  
Dies".  
  
The Stationary Head Burring Attachment is used to insure the  
piece being cut off without a burr.  
  
The burring spindle is moved forward and the chuck closed on the  
piece soon after the cutting off tool starts the cut. After the cut  
off tool passes the point where the piece would normally break off,  
the piece is still being driven by the burring spindle and as the  
cutoff tool advances past this point, it completely removes the burr  
normally left on the piece.  
  
The spindle then drops back, the chuck is opened and the continued  
backward movement ejects the finished piece. The cam (5-C-45-1) used  
to operate the burring spindle in this manner is furnished with the  
attachment.  
  
The purpose in presenting these tool layouts is to show how,  
after the tool is selected, to apply it to the machine.  
  
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THE THREADING SPINDLE  
  
The threading spindle is hardened and ground; the front box is  
of phosphorous bronze and the rear box of cast iron. The term thread-  
ing spindle is applied to this spindle, but this spindle is used for  
drilling, for broaching and for supporting the work.  
  
The thrust of the spindle is taken by a set of matched and marked  
bearings (three per set) held in a sliding sleeve. The threading  
spindle is driven by a quill gear which in turn is driven by an inter-  
mediate gear. This is driven from the threading clutch shaft. The  
intermediate gear is so located that two threading spindles may be  
used, one in the third position and one in the fourth position if so  
desired.  
  
THE THREADING CLUTCHES  
  
The threading clutches are located in the bracket at the rear  
  
of the stationary head. One clutch is referred to as the high speed  
side, the other the low speed side. To adjust the threading clutches,  
remove the set screw and tighten the nut the desired amount. Adjusting  
one slot of the clutch gear moves approximately .0026 which compressed  
the gripping sleeve on self-aligned clutch body by approximately .002  
diameter. CAUTION - Never move more than one slot without checking  
with torque wrench. This ball type threading clutch shifts so easy  
it is absolutely necessary to use a torque wrench on the threading  
spindles when making an adjustment. Use a 3/4 inch plug held in the  
spindle with the clamping collar. The plug should have a hexagon  
  
» head to suit the torque wrench. Adjust each side of the clutch to  
read 35 foot pounds when clutch has been run and is warmed to normal  
running temperature, checking often during the running-in period.  
NOTE - The clutch should be adjusted to read between 20 and 25 foot  
pounds when cold. The connecting rods with adjustable turnbuckles  
that shift the threading clutches must be kept properly adjusted to  
operate efficiently. Improperly adjusted rods may seriously damage  
the clutches. These rods must be adjusted separately as follows:  
First, disconnect the upper rod at the lever that operates the low  
speed side by removing the pin. The lower rod can now be adjusted  
to shift the low speed side correctly. If this rod is adjusted corr-  
ectly, it will be approximately 1/32 from bottoming out at the end of  
the stroke engaging the clutch. With the roll on the low side of the  
clutch shifting cam, the upper rod is then reconnected and is adjusted  
to shift the high speed side in a similar manner, except that the roll  
is on the high side of the clutch shifting cam. The clutch shifting  
cam for operating the threading clutches is located in the worm wheel  
on the tool spindle cam shaft. This cam may be set to shift the  
clutches at the correct time. To set the clutch shifting cam loosen  
or if necessary remove the screws and move the line mark (zero) to  
one of the desired positions described on the following pages. These  
positions are marked on the outer rim of the worm wheel. (BR means  
Brass (2:1) right hand thread, SR means Steel (6:1) right hand thread.)  
If it is desired to use the threading spindle for other operations  
where it does not revolve, it can be held stationary by removing the  
gear on the end of the threading shaft. Also, the pin is removed from  
the lever and used to fasten the connecting rod in the lower hole of  
the casting. The low speed side is engaged and the latch is inserted  
between the gear.  
  
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There are three basic threading methods used, and the 2:1  
threading method will be described first.  
  
2:1 THREADING METHOD (Formerly Brass Method)  
  
To cut right hand threads the threading shaft is driven by two  
gears. A 36 tooth driver and 27 tooth driven. The intermediate on  
the low speed side on the swinging arm is moved out of mesh. The  
latch is inserted between the teeth of the gear to prevent the low  
speed side from revolving. The line mark (zero) and the clutch shift-  
ing cam is moved to the position (BR). This setting shifts the clutch  
from the low speed side, which is stopped, to the high speed side at  
the highest point of a brass threading cam, which is normally 25 hund-  
redths. The threading spindle is stopped running on and revolved  
twice the speed of the work spindle in the same direction running off  
requiring two revolutions on the work spindle to cut one thread on  
and off.  
  
NOTE ~ We do not recommend the work spindle speed to exceed 2500 R.P.M.  
when running the clutch in this manner. 2500 R.P.M. work spindle,  
threading clutch low speed stopped, (Going In) and threading spindle  
stationary; shift threading clutch to high side to revolve the thread-  
ing spindle 5000 R.P.M. (Coming Out) NOTE - We do not recommend this  
clutch over 5000 R.P.M.  
  
To cut left hand threads; everything.remains the same as for  
right hand threads except the line marked (zero) on the clutch shifting  
cam is moved to the position (BL). This setting shifts the clutch from  
.the high speed side to the low speed side which is stopped at the high-  
est point on the thrdéading cam. The work spindles are revolved at any  
speed up to 2500 R.P.M. The threading spindle is revolved at twice  
the speed of the work spindle, in the same direction running on, and  
is stopped running off requiring two revolutions of the work spindle  
to cut one thread on and off. The cutting speed of the threading  
tool is the same as cutting on the other tools.  
  
6:1 THREADING METHOD (Formerly Steel Method)  
  
To cut right hand threads the threading shaft is driven by two  
gears, a 32 tooth driver and a 32 tooth driven, both of which are  
located in the rear of the machine next to the spindle change gears.  
The 28 tooth idler gear mounted on the swinging arm is moved so it  
meshes with the 21 tooth gear on the low speed side and the latch is  
withdrawn. The line mark (zero) and the clutch shifting cam are moved  
to position (SR). This setting shifts the clutch from the low speed  
side to the high speed side at the highest point of the steel (6:1)  
threading cam, normally 32-1/2 hundredths which operates the threading  
spindle.  
  
It may be necessary to vary this setting slightly after it is  
set on the mark, due to the load conditions and the speed of the cam  
shaft for various jobs. The threading spindle is revolved at 3/4 of  
the speed of the work spindle in the same direction, while the thread-  
ing tool is running on. It revolves 1-1/2 times the speed of the work  
  
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spindle in the same direction while the threading tool is running  
off, requiring six revolutions of the work spindle to cut one thread  
on and off. The cutting speed of the threading tool is 1/4 the cut-  
ting speed of the other tools. For example, if the work spindle  
speed is 1500 R.P.M. the threading spindle speed is 1125 R.P.M.,  
when the threading tool is running on and 2500 R.P.M. when running  
off. (1500 R.P.M.'s times 32 divided by 32 times 21 divided by 28  
low speed side equals 1125 R.P.M. on). (1500 R.P.M.'s times 32  
divided by 32 times 42 divided by 28 high speed side equals 2250  
R.P.M. off). The highest point of a standard steel (6:1) threading  
cam is 32-1/2 one hundredths, more of the circumferance of the cam  
is used to run the threading tool on than to run it off.  
  
Now look at the example, we find it takes four revolutions to  
cut one thread. Since there is a differential of 375 R.P.M. between  
the work spindle and the threading spindle, the threading spindle  
going slower, but when coming off the threading spindle goes 2250  
R.P.M. as opposed to 1500 R.P.M. for the work spindle. This is a  
differential of 750 R.P.M. Therefore, it would take two revolutions  
to come off one thread. Based on these figures it takes six revolu-~  
tions to cut one thread on and off.  
  
1500 R.P.M. Spindle Speed x 32 driver x 21 driver = 1125 R.P.M.  
L  
  
32 driven 28 driven  
  
1500 R.P.M. Work Spindle  
-1125 R.P.M. Threading Spindle (On)  
375 Cutting Revolutions (On)  
1500 R.P.M. Spindle Speed x 32 driver x 42 driver = 2250 R.P.M  
T 32 driven 28 driven  
  
2250 R.P.M. Threading Spindle (Off)  
1500 R.P.M. Work Spindle  
750 R.P.M. Cutting Speed (Off)  
  
Assume a cycle time of 2.4 per piece, 2 seconds working time  
and .4 index or idle time. 375 R.P.M. equals the actual cutting  
speed of the work. Since this is revolutions per minute we break  
it down into revolutions per second by dividing this by 60. After  
dividing this by 60 we have revolutions per second. Using the de-  
sired working time that we have selected, we will deduct the index  
or idle time. This 2 second time multiplied by the revolutions  
per second that we have found will give us the number of revolutions  
in 50 hundredths. After obtaining this figure we divide this figure  
by 50 and multiply by 32-1/2, 0 hundredths to 32-1/2 hundredths  
would be a standard steel (6:1) threading cam giving us the number  
of effective revolutions in 32-1/2 hundredths. These revolutions  
divided by the pitch of the thread gives the desired rise on the cam.  
The cam nearest the rise we have obtained is now selected.  
  
Divide the rise obtained by the rise on the cam that you are  
going tc use and you will find the block setting.  
  
To cut left hand threads the threading shaft is driven by two  
  
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gears, a 30 tooth driver and a 34 tooth driven. The mark zero on  
  
the clutch shifting cam is moved to the position (BL). This position  
is used because the standard 2:1 threading cam is used. This set-  
ting shifts the clutch from the high speed side to the low speed side  
at the highest point of the threading cam. The threading spindle is  
revolved at approximately 1-1/3 times the speed of the work spindle  
  
in the same direction running on, and it revolves approximatley  
  
2/3's the speed of the work spindle in the same direction running off,  
requiring six revolutions of the work spindle to cut one thread on and  
off. The cutting speed of the threading tool is 1/3 the cutting speed  
of the other tools. If the work spindle is 1500 R.P.M., the threading  
spindle is 1985 R.P.M. running on and 993 R.P.M. running off. To  
arrive at this we go through the steps (1500 R.P.M. times 30 dividea  
by 34 times 42 divided by 28 high speed side. This will equal 1985  
R.P.M. on.) (1500 R.P.M. times 30 divided by 34 times 21 dividea  
  
by 28 low speed side equals 993 R.P.M. off.)  
  
1500 R.P.M. Spindle Speed x 30 Driver x 42 Driver High Side = 1985  
1 34 Driven 28 Driven High Side R.P.M. (On)  
  
1985 R.P.M. Threading Spindle  
-1500 R.P.M. Work Spindle  
485 R.P.M. Cutting Revolutions On  
  
1500 R.P.M. Spindle Speed x 30 Driver x 21 Driver Low Side = 933  
1  
  
34 Driven 28 Driven Low Side R.P.M. (Of1  
  
1500 R.P.M. Work Spindle  
“7993 R.P.M, Threading Spindle  
507 R.P.M. Cutting Revolutions Off  
  
4:1 THREADING METHOD (Formerly 1/2:1 Threading Method)  
  
This is another threading method that is a combination of our  
steel (6:1) method and our brass (2:1) threading method which was  
formerly called 1/2:1 threading method, this is now called 4:1  
Threading Method. You can only cut right hand threads with this  
method, and must use a 32 tooth driver and a 32 driven gear on the  
threading shaft. (The 14 tooth gear on the low side replaces the 21  
tooth gear that is normally there, and the 35 tooth idler gear replaces  
the 28 tooth idler gear that is normally there. Therefore, on the low  
side it goes to a 14 tooth driver to a 35 tooth idler to a 28 tooth  
driven). The shifting cam is moved so the zero and BR are in line.  
This shifts the clutch at 25 hundredths and uses a brass (2:1) thread-  
ing cam. Assuming we have a 1500 R.P.M. spindle speed and 32-32  
threading gears our formula for the low side would be thus:  
  
1500 Spindle Speed x 32 Driver x 14 Driver x 35 Idler = 750 R.P.M.  
1 32 Driven 35 Idler 28 Driven  
  
1500 Work Spindle  
-750 R.P.M. Threading Spindle  
750 R.P.M. Cutting Revolutions On  
  
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For the high speed side the example would be thus:  
  
1500 Spindle Speed x 32 Driver x 42 Driver = 2250 R.P.M.  
1 32 Driven 28 Driven  
  
2250 Threading Spindle  
-1500 Work Spindle Speed  
750 R.P.M. Cutting Revolutions Off  
  
Take the 750 R.P.M. divide it by 60 to give us the revolutions per  
second. Now take the seconds selected to do the job less the index  
time, multiplied by the revolutions per second and you have the  
effective revolutions that may be cut. Divide this by the pitch of  
the thread and select the desired brass (2:1) threading cam. Take  
the rise of the desired brass (2:1) threading cam and divide this  
into the rise obtained from dividing the pitch into the number of  
effective revolutions. This will give you the block setting.  
  
It should be noted under threading that special cams can be  
used to work in conjunction with special side working cams. The  
line marked zero on the clutch shifting cam can be moved forward and  
backward. However, if it is moved far enough to allow only one screw  
to hold the clutch shifting cam the rear worm wheel should be removed  
and another bushing added to make sure there are two screws holding  
the clutch shifting cam.  
  
>. There is a quick, easy and accurate way to determine the rise  
of a threading cam fow any of the standard methods used for threading  
the machine. First, determine the number of threads that can be cut  
for any given cycle time using the appropriate threading method.  
Divide the number of threads that can be cut by the number of threads  
per inch. This will give you the true rise of the necessary threading  
cam. The appropriate threading cam can then be selected from the list  
of threading cams. Select the cam nearest the computed rise and adjust  
the block of the cam lever as necessary.  
  
SELF-OPENING DIE HEADS  
  
Self-Opening Die Heads either rotating or non-rotating may be  
used if desired to cut any of the various materials depending on the  
surface feet required. Two methods of rotating a self-opening die  
head are: from the center drive with special gears or using the  
threading clutch, either the high or low side of the clutches. The  
special gears are generally used in the second position, but may be  
used in any position. To cut a right hand thread you would use a  
smaller gear on the center drive and a larger gear on the spindle.  
Therefore, a standard threading cam can be used or a standard turn  
and drill cam utilizing the full 50 hundredths of the cam to cut a  
thread. It is not recommended to rotate the die head over 2250 R.P.M.,  
as centrifical force tends to keep the die head from closing. To  
cut a left hand thread just reverse this procedure, use a larger gear  
on the center drive and a smaller gear on the spindle. The following  
is an example for right hand thread:  
  
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1500 R.P.M. Spindle Speed x 20 Center Drive Gear = 1071.43 Threading  
L 28 Thrd. Spindle Gear Spindle  
  
1500 R.P.M. Spindle Speed  
-1071 R.P.M. Threading Spindle  
429 R.P.M. Cutting Revolutions Right Hand  
  
TO CUT RIGHT HAND THREADS (Using Threading Attachment)  
  
Threading shaft is driven by two gears that may be selected in the  
threading spindle speed chart for self-opening die heads. The 28  
tooth gear mounted on the swinging arm is moved so that it meshes  
with the gear on the low speed side and the latch is withdrawn.  
Also, the pin is removed from the lever and used to fasten the  
connecting rod in the lower hole of the casting, thus engaging the  
low speed side of the clutch.  
  
The threading spindle is revolved at 3/4 of the speed of the  
work spindle, in the same direction. The cutting speed of the die  
is 1/4 the speed of the other cutting tools.  
  
For example, if the work spindle is 1500 R.P.M., the threading  
spindle speed is 1125 R.P.M.:  
  
1500 R.P.M. x 32 Teeth x 21 (Low Speed Side) = 1125 R.P.M.  
32 Teeth 28  
  
If it is desired to use the high speed side of the clutch dis-  
engage the gear on the swinging arm and insert the latch between the  
gear teeth taking the pin and fasten the connecting rod in the upper  
hole of the casting thus engaging the high speed side of the clutch.  
  
TO CUT LEFT HAND THREADS  
  
The same procedure is used to use either high or low side of the  
clutch as mentioned before. On the high speed side the gears to be  
used would be any combination of gears beginning with a 38 tooth gear  
driving 26 driver tooth gear. The combination of any two gears whose  
teeth add up to 64 can be used, provided the resultant is not greater  
than 2250 R.P.M. On the low side of the clutch, start with gears 38  
tooth driving a 26 tooth, and proceed with combinations but not ex-  
ceeding 2250 R.P.M. This will always drive the threading spindle  
faster than the work spindle thus, we can cut a left hand thread.  
Select the pair of gears that will give us the desired revolutions from  
zero to fifty, then we can use a standard cam.  
  
To cut left hand threads, the threading shaft is driven by two  
gears, a 30 tooth driver and a 34 tooth driven. The pin holding the  
connecting rod is moved to the upper hole in the casting. This  
engages the high speed side.  
  
The threading spindle is revolved at approximately 1-1/3 times the  
  
speed of the work spindle, in the same direction. The cutting speed of  
the die is approximately 1/3 the speed of the other cutting tools.  
  
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For example, if the work spindle speed is 1500 R.P.M., the thread-  
ing spindle speed is approximately 2000 R.P.M.:  
  
1500 R.P.M. x 30 Teeth x 3 High Speed Side = 1985 R.P.M.  
34 Teeth 2  
  
To select the correct turn and drill cam and the location of the  
cam lever block, use the following formulas:  
  
Work spindle speed multiplied by driver divided by driven multi-  
plied by 3/4 (if right hand thread) or 3/2 (if left hand thread) equals  
R.P.M. of threading spindle.  
  
The difference in R.P.M. between the work spindle and threading  
spindle equals threading revolutions in one minute.  
  
Threading revolutions in one minute multiplied by the working  
time (time in seconds to complete one piece) minus the idle time  
(.4 second 75 cycle machine, .5 second 60 cycle machine, .66 second  
45 cycle machine) divided by 60 equals threading revolutions during  
the working portion (0-50) of a standard turn and drill cam.  
  
Threading revolutions during working time divided by the number  
of threads per inch equals rise of cam necessary. The block can be  
adjusted to allow die to pull ahead slightly.  
  
Select a standatd turn and drill cam from list on cam page with  
a rise nearest to rise of cam necessary. Rise of cam necessary di-  
vided by the rise on the turn and drill cam selected equals location  
of the cam lever block.  
  
For example, if the work spindle speed is 1500 R.P.M., the time  
in seconds to complete one piece is 4.4 and the thread is 24 pitch  
right hand:  
  
1500 R.P.M. x 32 Teeth x  
32 Teeth  
  
3 = 1125 R.P.M. of Threading Spindle  
4  
  
1500 R.P.M. of Work Spindle  
-1125 R.P.M. of Threading Spindle  
375 Threading Revolutions Per Minute  
  
375 multiplied by 4 seconds in working time equals 1500, 1500 divided  
by 60 equals 25 threading revolutions during working time. 25 thread-  
ing revolutions divided by 24 (Threads per Inch) equals 1.041" Rise of  
Cam Necessary. Standard turn and drill cam selected with rise nearest  
is 1" or approximately 1.04 location of block.  
  
NOTE - Always make certain that the number of threading revolu-  
tions during working portion, is at least three revolutions more than  
the number of threads to be cut, to allow for the lead in the chasers.  
  
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INTERMEDIATE  
  
GEAR (STEEL)  
  
REVERSING  
GEAR  
  
ARM  
  
INTERMEDIATE  
GEAR (CELERON)  
  
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When it is found there are many more revolutions than necessary  
to safely cut the number of threads required, it is advisable to  
increase the speed of the threading spindle when cutting right hand  
threads, or decrease the speed of the threading spindle when cutting  
left hand threads. This thereby reducing the threading revolutions  
per minute.  
  
USING THE REVERSING BLOCK  
  
This is a special attachment that can be purchased as an addition  
to the standard threading attachment, and is used to revolve the thread-  
ing spindle clockwise (right hand) to thread or drill when the work  
spindle is stopped. Example: Spindle speed is 2500 R.P.M., time to  
complete one piece is 1.8 seconds, the thread is 32 pitch right hand  
with 1/4" of thread. Checking the chart for 75 cycle self opening  
die heads at 2500 R.P.M., we find that the gear changes will give  
too many revolutions or exceed the recommended surface feet. So,  
an 18 tooth driver and a 46 tooth driven are adequate. If there  
were not enough revolutions with this combination, we would have  
to increase the time cycle.  
  
2500 R.P.M. spinais Speed x 18 Driver x 21 Driver = 733.7 R.P.M. Thrd  
46 Driven 28 Driven Revolutions  
  
733.7 R.P.M. Threading Revolutions = 12.23 Revolutions per Second  
60 Seconds  
  
12.23 Revolutions per Second x 1.4 Working Time = 17.12 Revolutions  
1 ' 1 From 0-50  
  
17.12 Revolutions from 0-50 = .34239 Revolutions per Hundredth  
50 Hundredths  
  
- 34239 Revolutions 32.5 Hundredths of Working 11.127 Effective  
Per Hundredth x Time Threading Cam = Revolutions  
1 L From 0-32.5  
11.127 Effective Revolutions form 0-32.5 = .3477 Rise Needed on Cam  
  
32 Pitch of Thread  
  
-3477 Rise Needed on Cam = 1.096 Block Location on Cam Lever  
~317 #3 Steel Threading Cam  
  
SUPPORTING WITH THE THREADING SPINDLE  
  
In the event that we have a threading attachment on the machine  
and we do not have the necessary equipment to run a support spindle  
off the center drive in the 3rd or 4th positions, we can run it off  
of the threading attachment. Threading spindles can be used, by  
driving it in the same direction as the work spindle at exactly the  
same spindle speed. To do this we drive the threading shaft with  
two gears, a 36 tooth driver and a 27 tooth driven. The pin is used  
to lock the clutch in the low side by fastening the connecting rod  
in the lower hole of the casting. This rotates the spindle in the  
  
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same direction as the work spindles, at the same spindle speed. For  
example, the work spindle speed is 1500 R.P.M., the threading spindle  
is also 1500 R.P.M. in the same direction. 1500 R.P.M. times 36  
divided by 27 times 21 divided by 28 equals 1500 low side.  
  
DRILLING WITH THE THREADING SPINDLE  
  
There are many times when it would be advantageous to drive the  
threading spindle in the opposite direction to the work spindles and  
use it as a drilling spindle. This can be done by locking the clutch  
in either of the high or low side and driving the threading shaft  
(5080-226-49) directly from the spindle change gear drive shaft (651-  
A-5). The only extra equipment necessary is a pair of special gears,  
49 tooth driver and 44 tooth driven. On a 75 cycle machine, using  
this method, a drilling spindle speed of 2507 R.P.M. can be obtained  
if locked in the high speed side or 1254 R.P.M. if locked in the low  
speed side plus the speed of the work spindle. For example, if the  
work spindle speed is 1501 R.P.M. and the clutch is locked on the low  
speed side, the threading spindle is driven 1254 R.P.M. in the opposite  
direction to the work spindle, given a combined drilling speed of 2755  
R.P.M. 1501 R.P.M. times 49 divided by 44 times 21 divided by 28 low  
speed side equals 1254 actual R.P.M. So we have 1501 R.P.M. plus 1254  
opposite direction equals 2755 R.P.M. combined drilling speed actual.  
The work spindle speed is 1501 R.P.M. and the clutch is locked in the  
high speed side, the threading spindle is driven 2507 R.P.M. in the  
opposite direction to the work spindle. The combined drilling speed  
would be 4008 R.P.M. 1501 R.P.M. times 49 divided by 44 times 42 di-  
vided by 28 high speed side equals 2507 R.P.M. actual. 1501 R.P.M.  
plus 2507 R.P.M.- opposite direction equals 4008 R.P.M. combined drill-  
ing speed actual.  
  
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CAPACITY - REGULAR MACHINE  
  
Maximum standard Capacity of Regular Chucks (646) - 5/8 Round, 9/16  
Hexagon, and 7/16 Square.  
  
Regular Capacity of Feed Tube (5080-636-1) - 9/16 Round, 1/2 Hexagon,  
and 13/32 Square.  
  
Regular Threaded Feed Fingers with .531 hole (645) - 1/2 Round, 7/16  
Hexagon, and 23/64 Square.  
  
Regular Threaded Feed Fingers (Drilled Out) with .594 hole (645) -  
9/16 Round, 1/2 Hexagon, and 13/32 Square.  
  
Special Feed Tubes with Soldered In Feed Fingers (5080-636-2)  
  
Soldered In Feed Fingers (645-1) - 5/8 Round, 9/16 Hexagon, and 7/16  
Square.  
  
Master Feed Fingers (645-36)  
  
Regular Master Feed Finger Pads (645-35) - 7/16 Round, 3/8 Hexagon,  
and 5/16 Square.  
  
Feed Tube Nut Bushings (644-2-3) - 5/8 Round, 9/16 Hexagon, and  
7/16 Square.  
  
CAPACITY ~ OVERSIZE MACHINE  
  
Maximum Standard Capacity of Oversize Chucks (2110) - 7/8 Round, 3/4  
Hexagon, and 5/8 Square.  
  
Oversize Capacity of Feed Tube (5080-2105) - 13/16 Round, 11/16 Hexagon,  
and 9/16 Square.  
  
Standard Oversize Feed Fingers (2109) - 23/32 Round, 5/8 Hexagon, and  
1/2 Square.  
  
Oversize Threaded Feed Fingers (2109-1) - 13/16 Round, 11/16 Hexagon,  
and 9/16 Square.  
  
Oversize One Piece Feed Tube (MB-5209) - 7/8 Round, 3/4 Hexagon, and  
5/8 Square.  
  
Master Feed Fingers (2109-9)  
  
Oversize Master Feed Finger Pads (2109-9-1) - 11/16 Round, 9/16 Hexagon,  
and 7/16 Square.  
  
Left End Feed Finger (2109-14)  
  
Left End Feed Finger Pad (2109-14-1) - 7/8 Round, 3/4 Hexagon, and 5/8  
Square.  
  
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## Page 85

GENERAL INFORMATION  
Longest Length Feed Regular 3"  
Special blocks can be furnished to feed 4-1/2" long.  
Standard on Extended Bed  
Longest length feed Extended Bed Machine 4-1/2" long.  
Longest length turned 2-1/2"  
Longest length turned Extended Bed Machine 3" long.  
Number of changes of spindle speeds - 27  
Range of Spindle Speeds:  
75 Cycle 500 R.P.M. to 4500 R.P.M.  
60 Cycle 400 R.P.M. to 3600 R.P.M.  
45 Cycle 311 R.P.M. to 2799 R.P.M.  
Number of changes of feed gears - 61  
75 Cycle .8 to 18.4 seconds (.4 Index)  
60 Cycle 1. to 22.69 Seconds (.5 Index)  
45 Cycle 1.3 to 29.6 Seconds (.666 Index)  
  
Drive Shaft Speed  
  
75 Cycle 1501 R.P.M. 8.6 P.D. Pulley Driven by 7.4 P.D. Motor  
’ Pulley  
  
60 Cycle 1217 R.P.M. 8.6 P.D. Pulley Driven by 6.0 P.D. Motor  
Pulley  
  
45 Cycle 933 R.P.M. 8.6 P.D. Pulley Driven by 4.6 P.D. Motor  
Pulley  
  
Handwheel Shaft Speed  
75 Cycle 750 R.P.M.  
60 Cycle 609 R.P.M.  
45 Cycle 467 R.P.M.  
  
Indexing Head and Feeding Stock  
75 Cycle .4 Seconds  
60 Cycle .5 Seconds  
45 Cycle .66 Seconds  
  
6:1 Threading Method (Formerly Steel Threading Method)  
Threading spindle revolves in same direction as work spindle, at  
a ratio of 3 to4, while threading tool is running on the work, and  
at 3 to 2 while running off (right hand threads).  
  
2:1 Threading Method (Formerly Brass Threading Method)  
Threading spindle is stopped when tool is running on, but runs  
twice the speed of the work spindle when running off (right hand  
threads).  
  
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## Page 86

4:1 Threading Method (Formerly 1/2:1 Threading Method)  
Threading spindle runs 1/2 the revolutions of the work spindle  
going on and 1-1/2 times the revolutions of the work spindle  
coming off.  
Diameter of Circular Form Tools - 2"  
Diameter of Hole in Tool Spindle - 3/4"  
Outside Diameter of Tool Spindle - 1-3/8"  
  
Minimum Distance Between Chuck and Tool Spindle Standard Machine -  
2-1/8"  
  
Minimum Distance Between Chuck and Tool Spindle Extended Bed Machine -  
4-1/8"  
  
Minimum Distance Between Chuck and Tool Spindle Extended Bed Machine -  
with Special Spindles - 2-1/8"  
  
Maximum Distance Between Chuck and Tool Spindle - 4-13/16"  
  
Maximum Distance Between Chuck and Tool Spindle Extended Bed Machine -  
6-13/16"  
  
Diameter of Standard Turning Cams - 7-1/2"  
; Diameter of Standard Form and Cutoff Cams - 6"  
Thickness of Cams - "3/8"  
Machine Designed for Motor Drive  
We recommend 7-1/2 H.P., totally enclosed, fan cooled, ball  
  
bearing motor.  
  
Motor, magnetic switch and push button, with all wiring in  
conduits are extra.  
  
Floor space - 39" x 177"  
Distance from top spindle to floor - 44-1/2"  
Standard Equipment With Each Machine:  
  
Chucks and Feed Fingers - 5 Each  
  
Cams - 9 Standard  
  
Spindle Change Gears - 2  
  
Feed Change Gear - 1  
  
Threading Change Gears - 2  
Wrenches, Screw Drivers, Etc.  
  
Page 88

## Page 87

Dimensions & Weights  
  
Size Crate -  
Size Crate -  
Net Weight -  
Net Weight -  
Net Weight -  
Net Weight -  
  
Gross Weight  
Gross Weight  
Gross Weight  
Gross Weight  
  
Gross Weight  
Gross Weight  
Gross Weight  
Gross Weight  
  
Machine 45"W x 98"L x 69"H  
  
Machine with Silencer 55"W x 98"L x 77"H  
  
Machine 3600 LBS. (Domestic or Foreign)  
  
Machine with Silencer 3900 LBS. (Domestic or Foreign)  
  
Wire Case Carrier - 175 LBS (Domestic or Foreign)  
  
Wire Case Carrier with Silencer Cover 175 LBS.  
  
(Domestic or Foreign)  
  
- Machine 3800 LBS. (Domestic Crated)  
  
- Machine with Silencer 4300 LBS. (Domestic Crated)  
  
- Wire Case Carrier 225 LBS. (Domestic Crated)  
  
- Wire Case Carrier with Silencer Cover - 225 LBS.  
(Domestic Crated)  
  
- Machine 4100 LBS (Foreign Crated)  
  
- Machine with Silencer 4400 LBS (Foreign Crated)  
  
- Wire Case Carrier 325 LBS. (Foreign Crated)  
  
- Wire Case Carrier with Silencer Cover 325 LBS.  
(Foreign Crated)  
  
Page 89

## Page 88

OUTLINE OF STANDARD CAMS  
  
HOLE IN ALL CAMS 2" DIA. KEYWAY + WIDE X a. OEEP  
WORKING PORTION O TO 50 IDLE PORTION 50 TO 0  
  
i2  
c7  
  
50 50  
BRASS THREADING STEEL THREADING SPECIAL DRILL  
  
Page 90

## Page 89

Recess Pusher Cam ~ 5-C-31  
  
Rise (.100" 2-41) Dwell 41-46, Drop 1-1/4"  
  
Support Cam - 5  
Dwell 1-52  
  
-C-32-1  
  
, Drop 1-5/8"  
  
Low Pointing Cam - 5-C-42  
  
Rise (1/32" 0-17) Dwell 17-32, Drop 1-1/8"  
  
High Pointing Cam - 5-C-44  
  
Rise (1/32" 0-17) Dwell 17-32, Drop 1-5/8"  
  
6:1 THREADING CAMS (Formerly Steel Threading Cams)  
  
CAM # RISE  
  
-118"  
200"  
317"  
-452"  
2715"  
1.140"  
1.740"  
2.000"  
2.000"  
2.000"  
  
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ry  
  
2:1 THREADING CAMS (Formerly Brass Threading Cams)  
  
CAM # RISE  
  
+238"  
-389"  
+560"  
+675"  
1.095"  
1.525"  
2.000"  
2.000"  
  
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100ths  
  
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16-32%  
225-324  
  
100ths  
  
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5-25  
12-25  
  
Page 91  
  
DROP  
  
137"  
232"  
366"  
-540"  
825"  
1.320"  
2.100"  
2.000"  
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DROP  
  
-276"  
-450"  
-657"  
-782"  
1.265"  
1.770"  
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## Page 90

LIST OF STANDARD CAMS (Usually in Stock)  
  
RISE  
  
1/8"  
1/4"  
3/8"  
1/2"  
5/8"  
3/4"  
7/8"  
1"  
1-1/8"  
1-1/4"  
1-1/2"  
1-3/4"  
2"  
2-1/8"  
  
1/32"  
1/16"  
3/32"  
1/8 “  
5/32"  
3/16"  
7/32"  
1/4 "“  
9/32"  
5/16"  
11/32"  
3/8 "  
13/32"  
7/16"  
  
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0-493;  
0-49%  
0-49%  
0-48  
0-48%  
0-484  
  
FORM AND CUTOFF CAMS  
Rise 0-45, Dwell 45-50, Drop 1-1/4"  
  
TURN AND DRILL CAMS  
  
DWELL  
  
46-50  
48-50  
48-50  
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4945-50  
495-50  
4945-50  
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484-49  
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484-49  
  
Page 92  
  
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## Page 91

STANDARD SPINDLE CHANGE  
  
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5330-23  
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5330-25  
949  
5330-27  
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5330-29  
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5330-31  
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5330-33  
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5330-39  
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STANDARD FEED CHANGE  
  
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5320-28  
5320-29  
5320-30  
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5320-36  
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5320-43  
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5320-48  
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5320-54  
5320-60  
5320-64  
5320-67  
5320-75  
5320-86  
  
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## Page 92

DECIMAL EQUIVALENTS OF FRACTION, WIRE GAUGE, LETTER AND  
  
DECIMAL DECIMAL DECIMAL DECIMAL] ci7¢ DECIMAL] oi7p DECIMAL  
SIZE inches \_ | SIZE INCHES SIZE incues \_|S!ZE\_incues | S!2E INCHES INCHES  
  
97.0059 0410 2.75mm .1083  
96.0063 1.05e 0413 7/64 .1094  
95 .0067 58 .0420 35.1100 Sim  
94.0071 57.0430 2.8mm .1102 7  
93.0075 l.imm .0433 34 1110 13/64  
92.0079 |1.15mm .0453 33.1130 6  
-2mm .0079 56.0465 2.9mm .1142 5. 2mm  
91 .0083 3/64 0469 32 .1160 5  
90 .0087 1.2mm .0472 3mm .1181 | 5.25mm  
-22mm .0087 41.25mm .0492 31 .1200 5.3mm  
89.0091 1.3mm .0512 3.1mm .1220 y  
88 .0095 55 .0520 1/8 .1250 5.4mm  
.25mm =.0098 =41.35mm .0531 3.2mm .1200 3  
87 .0100 54.0550 3.25mm .1280 5.5mm  
86 .0105 1.4mm .0551 30.1285 7/32  
85.0110 |1.45mm .0571 3.3mm .1299 5.6mm  
-28mm = .0110 1.5mm .0591 3.4mm .1339 2  
84 .0115 53.0595 29 .1360 5.7mm  
.3mm = =.0118 |1.55mm .0610 3.5mm .1378 | 5.75mm  
83.0120 1/16 .0625 28.1405 1 . .  
82.0125 1.6mm .0630 9/64 .1406 5.8mm . . .6875  
-32mm =-.0126 52.0635 3.6mm .1417 5.9mm  
81.0130 |1.65mm .0650 27.1440 A  
80 .0135 1.7mm .0669 3.7mm .1457 15/64 .  
-35mm = .0138 51 .0670 26.1470 6mm. . . - 7188  
79.0145 [1.75mm .0689 3.75mm .1476 B. . . - 7283  
1/64 .0156 50 .0700 25.1495 6.1mm. 3 7344  
-4mm = .0157 1.8mm .0709 3.8mm .1496 cc. : . - 7480  
78 °.0160 11.85mm .0728 » 24 1520 6.2mm. . . 7500  
-45mm = .0177 49.0730 3.9mm 1535 D. . : - 7656  
77 ~+.0180 1.9mm .0748 23. 61540 | 6.25mm . . . . - 7677  
.5mm .0197 48 0760 5/32 .1562 6.3mm . . . - 7812  
76.0200 |1.95mm .0768 22 .1570 E. . 7874  
75.0210 5/64 .0781 4mm 1575 vy. . . - 7969  
.55mm .0217 47.0785 21.1590 6.4mm. : . . .8071  
74 0225 2mm .0787 20 .1610 6.5mm . . 8125  
-6mm .0236 |2.05mm .0807 4.1mm .1614 Fo. . -8268  
73.0240 46.0810 4.2mm £1654 6.6mm . . . -8281  
72 .0250 45 0820 19.1660 G. . . 8438  
-65mm .0256 2.1mm .0827 4,25mm .1673 6.7mm. . . . «8465  
71.0260 «|2.15mm .0846 4.3mm .1693 17/64. : : 8594  
- 7mm 0276 4h 0860 18 .1695 |6.75mm . . -8661  
70 .0280 2.2mm .0866 11/64 .1719 H. . : 8750  
69 .0292 |2.25mm .0886 17.1730 6.8mm . . . 8858  
.75mm .0295 43.0890 4.4mm = .1732 6.9mm . . .8906  
68 .0310 2.3mm .0906 16 .1770 I. : -9055  
1/32 .0312) «(2.35mm = .0925 4.5mm .1772 7mm . 9062  
.8mm .0315 42.0935 15 .1800 I. . 9219  
67 .0320 3/32 .0938 4.6mm 1811 7.1m . . . 9252  
66 .0330 2.4mm 0945 14.1820 K . . . -9375  
.85mm = .0335 41.0960 13. .1850 9/32. . -94k9  
65.0350 |2.45mm .0965 4.7mm .1850 7.2mm : 9531  
-9mm = .0354 40 =.0980 4.75mm .1870 | 7.25mm . . . . ene  
64 = .0360 2.5mm .0984 16.1 3mm . . 9  
63 0390 39 0998 ¥ mim 1833 73 Li. 9 : - 9843  
62 .0380 2.6mm .1024 11.1910 M. . 1 1.0000  
61 .0390 37 «1040 4.9mm = .1929 | 7.5mm  
lmm .0394 1063 10.1935 19/64  
60 .0400 . 1065 9.1960 7.6mm  
  
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## Page 93

3-140 HOLES  
120° APART  
  
A-LARGEST DIAMETER OF FORM TOOL 2"  
  
CENTER OF FORM TOOL IS |g" ABOVE CENTER OF WORK  
TO PROVIDE PERIPHERY CLEARANCE  
  
(A  
| RE  
G-20USF LH.  
  
A- LARGEST POSSIBLE DIAMETER OF SIZING TOOL 1.300"  
CENTER OF SIZING TOOL IS !44" ABOVE CENTER OF WORK  
TO PROVIDE PERIPHERY CLEARANCE  
  
an  
ig 20U.SE LH.  
  
A-LARGEST POSSIBLE DIAMETER OF POINTING TOOL | Ya"  
CENTER OF POINTING TOOL IS 3/32" ABOVE CENTER OF  
WORK TO PROVIDE PERIPHERY CLEARANCE  
  
WHEN CALCULATING CORRECTED DIAMETERS OF CIRCULAR  
TOOLS WE RECOMMEND THE TABLE IN MACHINERY HAND BOOK  
  
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TABLE OF CORRECTED DIAMETERS FOR 2.000” FORM TOOLS  
  
i  
qk 6-.140 HOLES  
60° APART  
“D" = ¥ the difference in diameter between the smallest work diameter and each succeeding work  
  
diameter.  
  
’  
The corrected tool diameters in this table are figured with the tool notched and cutting in the position  
shown in the illustration above.  
  
The maximum diameter of the form tool is 2.000”.  
  
INSTRUCTIONS  
To find the other diameters of the too! for any piece to be formed, proceed as follows:  
  
Subtract the smallest diameter of the work from that diameter of the work which is to be formed by  
the required tool diameter; divide the remainder by 2; locate the answer obtained in the column headed  
“D” and opposite this figure read off directly the corrected diameter to which the tool is to be made. For  
example: A piece of work to be formed has two diameters, one being .226” and the other .500”; find the tool  
diameters. The maximum tool diameter is 2.000”. This will be the diameter that will form the .226” diameter  
of the work. To find the other diameter, proceed according to the rule given:  
  
.500” minus .226” = .274”; .274” + 2 = .137” (D)  
In the column under ‘“‘D’’, opposite .137” we find the required tool diameter — 1.7360”.  
  
CUTTING OFF OR FACING END OF WORK  
  
When the largest diameter of the tool is cutting beyond the center of the work, such as a cut off tool,  
double the amount the tool goes by center and add this to all other work diameters to be formed before  
calculating “D”’.  
  
Form 476  
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## Page 95

TABLE OF CORRECTED DIAMETERS FOR 2.000” FORM TOOLS  
  
Corrected Corrected Corrected Corrected  
  
D Tool Dia. D Tool Dia. D Tool Dia. D Tool Dia.  
  
-000” 2.000” .054” 1.8954” 108” 1.7916” .162” 1.6881”  
-001 1.9980 -055 1.8935 109 1.7897 -163 1.6862  
-002 1.9961 -056 1.8916 110 1.7877 -164 1.6843  
-003 1.9941 -057 1.8897 111 1.7858 -165 1.6824  
-004 1.9922 -058 1.8878 112 1.7838 -166 1.6805  
-005 1.9902 -059 1.8859 113 1.7819 167 1.6786  
-006 1.9883 .060 1.8840 114 1.7800 165 1.6767  
-007 1.9863 -061 1.8820 115 1.7781 .169 1.6748  
-008 1.9844 -062 1.8801 116 1.7762 170 1.6729  
.009 1.9824 .063 1.8781 117 1,7743 A71 1.6709  
.O10 1.9805 .064 1.8762 118 1.7724 -172 1.6690  
-O11 1.9785 -065 1.8743 119 1.7705 173 1.6671  
-O12 1.9766 .066 1.8724 120 1.7685 174 1.6652  
.013 1.9746 -067 1.8705 121 1.7666 175 1.6633  
014 1.9727 -068 1.8686 122 1.7647 176 1.6614  
.015 1.9708 -069 1.8667 123 1.7628 177 1.6595  
-016 1.9689 -070 1.8647 124 1.7609 178 1.6576  
.017 1.9670 .O71 1.8628 125 1.7590 179 1.6557  
-018 1.9651 .072 1.8608 126 1.7571 .180 1.6538  
.019 1.9631 -073 1.8589 127 1.7552 181 1.6519  
-020 1.9612 .074 1.8570 128 1.7533 182 1.6500  
021 1.9592 075 1.8550 129 1.7514 183 1.6480  
-022 1.9573 .076 1.8531 130 1.7494 184 1.6461  
.023 1.9554 -077 1.8512 131 1.7475 185 1.6442  
-024 1.9534 .078 1.8493 132 1.7456 186 1.6423  
-025 1.9515 , -079 1.8474 133 1.7437 187 1.6404  
.026 1.9495 .080 1.8454 134 1.7418 188 1.6385  
-027 1.9476 -031 1.8435 135 1.7399 189 1.6366  
028 1.9457 082 1.8415 136 1.7380 -190 1.6347  
-029 1.9438 -083 1.8396 137 1.7360 191 1.6328  
-030 1.9419 .084 1.8377 138 1.7341 192 1.6309  
-031 1.9400 -085 1.8358 139 1.7322 193 1.6290  
-032 1.9381 -086 1.8339 .140 1.7302 194 1.6271  
.033 1.9361 -087 1.8320 141 1.7283 195 1.6252  
-034 1.9342 -088 1.8300 142 1.7263 196 1.6233  
-035 1.9323 .089 1.8281 143 1.7244 197 1.6214  
.036 1.9303 -090 1.8262 144 1.7225 .198 1.6195  
.037 1.9284 .091 1.8242 145 1.7206 -199 1.6176  
-038 1.9264 .092 1.8223 .146 1.7187 .200 1.6157  
-039 1.9245 093 1.8203 .147 1.7168 201 1.6138  
-040 1.9225 .094 1.8184 -148 1.7149 .202 1.6119  
041 1.9206 -095 1.8165 -149 1.7130 .203 1.6100  
.042 1.9187 .096 1.8146 -150 1.7111 .204 1.6081  
043 1.9167 -097 1.8127 USL 1.7091 .205 1.6062  
044 1.9148 -098 1.8108 152 1.7072 -206 1.6043  
.045 1.9129 .099 1.8089 153 1.7053 .207 1.6024  
-046 1.9109 .100 1.8069 .154 1.7034 -208 1.6005  
-047 1.9090 101 1.8050 -155 1.7015 .209 1.5986  
.048 1.9071 -102 1.8030 156 1.6996 .210 1.5967  
-049 1.9051 -103 1.8011 157 1.6977 -211 1.5948  
-050 1.9032 - 104 1.7992 158 1.6958 212 1.5929  
-O51 1.9012 105 1.7973 .159 1.6939 213 1.5910  
-052 1.8993 -106 1.7954 .160 1.6920 214 1.5891  
-053 1.8973 .107 1.7935 -161 1.6900 215 1.5872  
  
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TABLE OF CORRECTED DIAMETERS FOR 2.000” FORM TOOLS  
  
Corrected Corrected Corrected Corrected  
D Tool Dia. D Tool Dia. D Tool Dia. D Tool Dia.  
-216” 1.5853” .270” 1.4832” 324” 1.3821” .378” 1.2820”  
.217 1.5834 .271 1.4813 325 1.3802 379 1.2801  
218 1.5815 -272 1.4794 326 1.3784 380 1.2782  
219 1.5796 273 1.4776 327 1.3765 381 1.2764  
.220 1.5777 274 1.4758 .328 1.3746 382 1.2746  
221 1.5758 275 1.4739 .329 1.3727 .383 1.2728  
.222 1.5739 -276 1.4720 .330 1.3708 384 1.2710  
.223 1.5720 .277 1.4701 1331 1.3690 385 1.2691  
.224 1.5701 .278 1.4682 .332 1.3672 386 1.2672  
-225 1.5682 .279 1.4663 .333 1.3653 387 1.2654  
.226 1.5663 .280 1.4644 334 1.3634 388 1.2636  
227 1.5644 281 1.4626 335 1.3616 389 1.2618  
228 1.5626 -282 1.4608 336 1.3598 390 1.2599  
.229 1.5607 283 1.4589 337 1.3579 391 1.2580  
.230 1.5588 .284 1.4570 338 1.3560 392 1.2562  
231 1.5569 285 1.4551 339 1.3541 393 1.2544  
232 1.5550 -286 1.4532 .340 1.3522 394 1.2526  
233 1.5531 287 1.4513 341 1.3504 395 1.2508  
234 1.5512 -288 1.4494 342 1.3486 396 1.2490  
235 1.5493 .289 1.4475 343 1.3468 397 1.2471  
236 1.5474 -290 1.4456 344 1.3449 398 1.2452  
237 1.5455 291 1.4438 345 1.3430 399 1.2434  
238 1.5436 292 1.4419 346 1.3412 -400 1.2415  
.239 1.5417 293 1.4400 347 1.3393  
4240 1.5398 294 1.4382 -348 1.3374  
241 1.5379 .295 \* 1.4364 349 1.3356  
242 1.5360 .296 1.4345 350 1.3337  
243 1.5341 297 1.4326 351 1.3318  
244 1.5322 .298 1.4307 352 1.3300  
245 1.5303 .299 1.4288 353 1.3281  
.246 1.5284 .300 1.4269 -354 1.3262  
247 1.5265 301 1.4250 .355 1.3244  
248 1.5246 302 1.4231 -356 1.3225  
.249 1.5228 .303 1.4212 357 1.3206  
.250 1.5209 .304 1.4193 358 1.3188  
-251 1.5190 305 1.4174 359 1.3170  
252 1.5172 -306 1.4156 .360 1.3151  
253 1.5153 -307 1.4138 361 1.3132  
1254 1.5134 -308 1.4119 362 1.3114  
255 1.5115 .309 1.4100 363 1.3096  
.256 1.5096 .310 1.4081 364 1.3078  
257 1.5078 31l 1.4062 -365 1.3060  
.258 1.5059 .312 1.4043 -366 1.3041  
.259 1.5040 313 1.4024 367 1.3022  
-260 1.5021 314 1.4006 -368 1.3004  
261 1.5002 -315 1.3988 -369 1.2986  
-262 1.4983 31 1.3970 -370 1.2967  
263 1.4964 317 1.3952 371 1.2949  
-264 1.4945 318 1.3933 .372 1.2930  
265 1.4926 -319 1.3914 373 1.2911  
-266 1.4908 -320 1.3895 374 1.2892  
-267 1.4889 321 1.3876 375 1.2874  
-268 1.4870 322 1.3858 -376 1.2856  
-269 1.4851 -323 1.3840 377 1.2838

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TABLE OF CORRECTED DIAMETERS FOR 2.125” FORM TOOLS  
  
3  
ig MIN.  
6-.140 HOLES  
  
60° APART  
  
WORK  
  
pe  
  
“D" = the difference in diameter between the smallest work diameter and each succeeding work  
diameter.  
  
The corrected tool diameters in this table are figured with the tool notched and cutting in the position  
shown in the illustration above.  
  
The maximum diameter of the form tool is 2.125”.  
  
To find the other diameters of the tool for any piece to be formed, proceed according to the instructions  
given for 2.000” diameter form tools.  
  
NOTE: All 2.125” form tools must have a shoulder 7” wide (minimum) by 2.000” diameter (maximum)  
on the side of the tool toward the chuck in order to fit the tool seats. This usually makes the inside cutting  
edge of the form tool 7” farther from the chuck than would be necessary with the 2.000” diameter form tool.  
This larger diameter form tool is used to form diameters under .125” and for cutting off on machines equipped  
with oversize spindles.  
  
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TABLE OF CORRECTED DIAMETERS FOR 2.125” FORM TOOLS  
  
Corrected Corrected Corrected Corrected  
  
D Tool Dia. D Tool Dia. D Tool Dia. D Tool Dia.  
  
-0007 2.125” .054” 2.0203” .108” 1.9157” 162” 1.8117”  
-001 2.1230 -055 2.0183 109 1.9138 -163 1.8098  
-002 2.1211 .056 2.0164 .110 1.9119 .164 1.8078  
-003 2.1192 -057 2.0144 Alt 1.9100 165 1.8059  
004 2.1173 -058 2.0125 112 1.9081 166 1.8040  
-005 2.1153 -059 2.0105 113 1.9061 167 1.8021  
-006 2.1134 -060 2.0086 114 1.9042 168 1.8002  
007 2.1114 -061 2.0066 115 1.9022 169 1.7983  
008 2.1095 -062 2.0047 116 1.9003 .170 1.7964  
009 2.1075 063 2.0027 AL7 1.8984 A171 1.7945  
.010 2.1056 064 2.0008 118 1.8964 172 1.7925  
011 2.1036 -065 1.9989 119 1.8945 173 1.7906  
012 2.1017 .066 1.9970 .120 1.8926 174 1.7887  
.013 2.0997 067 1.9951 121 1.8907 175 1.7868  
014 2.0978 .068 1.9931 122 1.8887 -176 1.7849  
O18 2.0959 -069 1.9912 -123 1.8868 177 1.7830  
.016 2.0939 -070 1.9893 .124 1.8848 178 1.7811  
.017 2.0920 -071 1.9873 125 1.8829 .179 1.7791  
018 2.0901 .072 1.9854 -126 1.8810 180 1.7772  
019 2.0881 .073 1.9834 127 1.8791 181 1.7753  
.020 2.0862 .074 1.9815 -128 1.8771 182 1.7734  
021 2.0842 .075 1.9796 129 1.8752 .183 1.7715  
022 2.0823 .076 1.9776 -130 1.8733 184 1.7695  
023 2.0804 .077 1.9757 A3L 1.8714 185 1.7676  
024 2.0784 .078 1.9738 -132 1.8694 186 1.7656  
025 2.0765 .079 1.9718 133 1.8675 187 1.7637  
026 2.0746 -080 1.9699 134 1.8656 188 1.7618  
027 2.0726 081 1.9680 135 1.8636 189 1.7599  
028 2.0707 082 1.9661 136 1.8617 .190 1.7580  
.029 2.0687 083 1.9641 137 1.8598 191 1.7561  
-030 2.0668 -084 1.9622 138 1.8579 192 1.7542  
.031 2.0648 085 1.9603 139 1.8560 .193 1.7522  
.032 2.0629 .086 1.9583 .140 1.8541 194 1.7503  
.033 2.0610 -087 1.9564 141 1.8521 195 1.7484  
034 2.0590 088 1.9544 142 1.8502 .196 1.7465  
035 2.0571 -089 1.9525 143 1.8483 197 1.7445  
.036 2.0552 -090 1.9506 144 1.8464 .198 1.7426  
.037 2.0532 -091 1.9486 145 1.8444 .199 1.7407  
038 2.0513 .092 1.9467 146 1.8425 .200 1.7388  
.039 2.0494 093 1.9448 .147 1.8405 .201 1.7369  
.040 2.0474 -094 1.9428 148 1.8386 .202 1.7350  
041 2.0455 -095 1.9409 149 1.8367 -203 1.7330  
.042 2.0435 -096 1.9390 150 1.8348 204 1.7311  
043 2.0416 .097 1.9370 151 1.8328 205 1.7292  
.044 2.0396 -098 1.9351 182 1.8309 .206 1.7273  
045 2.0377 -099 1.9331 153 1.8290 -207 1.7254  
046 2.0358 -100 1.9312 -154 1.8270 208 1.7235  
047 2.0338 101 1.9292 -155 1.8251 .209 1.7216  
048 2.0319 -102 1.9273 -156 1.8232 -210 1.7197  
-049 2.0299 103 1.9253 157 1.8213 211 1.7178  
-050 2.0280 .104 1.9234 -158 1.8194 .212 1.7159  
-051 2.0261 105 1.9215 159 1.8175 213 1.7140  
.052 2.0242 -106 1.9195 .160 1.8156 214 1.7121  
053 2.0222 -107 1.9176 .161 1.8136 218 1.7102  
  
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TABLE OF CORRECTED DIAMETERS FOR 2.125” FORM TOOLS  
  
Corrected Corrected Corrected Corrected  
  
D Tool Dia. D Tool Dia. D Tool Dia. D Tool Dia.  
216” 1.7083” 271” 1.6033” 325” 1.5012” .379” 1.3998”  
-217 1.7064 2272 1.6014 326 1.4993 380 1.3979  
218 1.7045 .273 1.5995 327 1.4974 381 1.3960  
.219 1.7025 274 1.5976 328 1.4955 382 1.3942  
.220 1.7006 .275 1.5957 329 1.4936 383 1.3923  
.221 1.6987 .276 1.5938 330 1.4917 384 1.3905  
222 1.6968 -277 1.5920 331 1.4898 385 1.3886  
223 1.6949 .278 1.5901 332 1.4880 .386 1.3867  
.224 1.6930 .279 1.5882 333 1.4861 387 1.3849  
.225 1.6910 .280 1.5863 334 1.4842 -388 1.3830  
.226 1.6891 .281 1.5844 335 1.4824 389 1.3811  
.227 1.6872 -282 1.5825 336 1.4805 .390 1.3792  
.228 1.6853 .283 1.5806 337 1.4786 391 1.3774  
.229 1.6834 .284 1.5787 338 1.4767 392 1.3755  
.230 1.6815 285 1.5768 339 1.4748 393 1.3737  
.231 1.6796 .286 1.5749 340 1.4729 394 1.3719  
232 1.6777 .287 1.5730 341 1.4710 395 1.3700  
.233 1.6758 .288 1.5711 342 1.4691 396 1.3681  
234 1.6739 .289 1.5692 343 1.4672 .397 1.3662  
235 1.6720 .290 1.5673 344 1.4654 398 1.3644  
236 1.6700 291 1.5654 345 1.4635 399 1.3625  
237 1.6681 .292 1.5635 346 1.4616 .400 1.3606  
.238 1.6662 293 1.5616 347 1.4598  
  
.239” 1.6643”  
  
.240 1.6624 .294 1.5597 348 1.4579  
  
241 1.6605 , 295 1.5578 349 1.4560  
242 1.6586 296 1.5559 350 1.4541  
243 1.6567 .297 1.5540 351 1.4522  
244 1.6548 298 1.5521 352 1.4505  
245 1.6529 .299 1.5502 353 1.4485  
.246 1.6510 300 1.5483 354 1.4466  
247 1.6490 .301 1.5464 355 1.4448  
.248 1.6471 302 1.5445 356 1.4429  
.249 1.6452 .303 1.5426 357 1.4410  
-250 1.6433 -304 1.5407 358 1.4391  
251 1.6414 305 1.5388 359 1.4372  
282 1.6395 .306 1.5369 360 1.4353  
  
253 1.6376 -307 1.5350 361 1.4334  
-254 1.6357 308 1.5332 362 1.4315  
.255 1.6338 309 1.5313 363 1.4297  
-256 1.6319 .310 1.5294 364 1.4278  
.257 1.6300 311 1.5275 365 1.4260  
.258 1.6281 312 1.5256 366 1.4241  
.259 1.6262 -313 1.5238 367 1.4222  
.260 1.6243 314 1.5219 368 1.4204  
-261 1.6224 315 1.5200 369 1.4185  
-262 1.6205 316 1.5181 370 1.4166  
-263 1.6186 317 1.5162 371 1.4147  
-264 1.6167 318 1.5143 372 1.4129  
-265 1.6148 .319 1.5124 373 1.4110  
-266 1.6129 -320 1.5105 374 1.4092  
.267 1.6110 321 1.5086 375 1.4073  
-268 1.6090 -322 1.5068 376 1.4054  
-269 1.6071 323 1.5049 377 1.4035  
-270 1.6052 .324 1.5030 378 1.4017  
  
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3125  
  
HOLE  
  
GHUCK  
  
The illustration above shows the relative position of the work to the sizing tool and roll when using either  
the Regular or Oversize Holder.  
  
The hole in the sizing tool roll and the outside diameter must be concentric within .0002” total indicator  
reading.  
  
Form 576  
  
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TABLE OF CORRECTED DIAMETERS FOR REGULAR SIZING TOOL HOLDER  
A—}” Center distance  
B—}4" Center distance  
C—1l4” Holder opening (See Note \*)  
  
The corrected diameters in this table are figured with the tool notched and cutting in the position as  
shown in the illustration.  
  
The maximum sizing tool diameter is 1.3012”, Work Diameter capacity .000” to .500”.  
  
INSTRUCTIONS  
  
The corrected tool and roll diameters can be taken directly from the table for all work diameters from  
.075" to .500”.  
  
WHEN THE WORK DIAMETER IS UNDER .075’:  
  
When the smallest work diameter is less than .075”, add the difference between .075” and the smallest  
work diameter to be sized to all work diameters and use this new figure to locate the corrected diameters  
in the table. For example:  
  
If the work diameters to be sized are .045”, .060” and .125”, add the difference between .075” and .045”  
(.030”) to all work diameters.  
  
‘ TABLE  
Work Corrected  
Dia. Tool Dia.  
.045” plus .030”............0.. .075” 1.3012”  
-060” plus .030”............... -090 1.2865  
.125” plus .030”............... 155 1.2228  
  
When it is necessary to compensate for the tool diameter, as explained above, always add this difference  
to the roll diameter that is rolling on the work. This will keep the spread of the holder (A and B) between  
tool and roll approximately the same and will keep the amount of adjustment in the holder constant. For  
example: If in the example above the roll was rolling on the .125” diameter, add the difference of .030” to  
the actual roll diameter of .875”.  
  
.500” (B) minus .0625” = .4375” x 2 = .875” actual roll dia.  
875” plus .030” = .905” roll diameter  
FACING END OF WORK TO CENTER  
  
Always use the maximum tool diameter allowed, 1.3012”, when facing the end of a piece. Add .085” to  
all other work diameters before referring to table for corrected diameters.  
  
\*The holder opening (C) does not permit work from .469” to .500” diameter to extend from the chuck  
beyond the cutting tool.  
  
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TABLE OF CORRECTED DIAMETERS FOR REGULAR SIZING TOOL HOLDER  
  
Work Corrected Roll Work Corrected Roll Work Corrected Roll  
Dia. Tool Dia. Dia. Dia. Tool Dia. Dia. Dia. Tool Dia. Dia.  
-075” 1.3012” 925” .129” 1.2482” -8717 183” 1.1954” -817”  
-076 1.3002 924 .130 1.2473 .870 -184 1.1944 .816  
.077 1.2992 -923 A31 1.2463 .869 185 1.1935 815  
-078 1.2982 922 132 1.2453 -868 186 1.1925 814  
.079 1.2972 921 133 1.2443 867 187 1.1915 -813  
.080 1.2963 -920 134 1.2433 866 188 1.1905 -812  
-081 1.2953 919 135 1.2424 -865 -189 1.1895 -811  
-082 1.2943 918 .136 1.2414 -864 -190 1.1886 .810  
-083 1.2933 917 137 1.2404 -863 191 1.1876 .809  
.084 1.2923 916 138 1.2394 -862 192 1.1866 .808  
085 1.2914 -915 139 1.2384 861 193 1.1856 .807  
-086 1.2904 914 .140 1.2375 .860 194 1.1846 806  
.087 1.2894 913 141 1.2365 859 195 1.1837 805  
.088 1,2884 912 -142 1.2355 858 -196 1.1827 804  
.089 1.2874 911 143 1.2345 857 197 1.1817 .803  
.090 1.2865 .910 .144 1.2335 856 .198 1.1807 802  
.091 1.2855 -909 145 1.2326 .855 .199 1.1797 801  
.092 1.2845 -908 146 1.2316 -854 .200 1.1788 -800  
.093 1.2835 -907 147 1.2306 853 201 1.1778 .7199  
094 1.2825 -906 148 1.2296 852 .202 1.1768 798  
-095 1.2816 -905 149 1.2286 -851 203 1.1758 797  
-096 1.2806 904 150 1.2277 850 204 1.1748 796  
.097 1.2796 903 ASI 1.2267 849 -205 1.1739 795  
098 1.2786 -902 152 1.2257 848 -206 1.1729 .794  
.099 1.2776 901 153 1.2247 847 .207 1.1719 793  
.100 1.2767 -900 154 1.2237 .846 208 1.1709 792  
101 1.2757 899 155 1.2228 845 .209 1.1699 791  
102 1.2747 898 .156 1.2218 844 .210 1.1690 -790  
.103 1.2737 897 157 1.2208 843 211 1.1680 789  
104 1.2727 .896 158 1.2198 842 212 1.1671 788  
105 1.2718 -895 159 1.2188 -841 213 1.1661 -787  
106 1.2708 894 .160 1.2179 -840 214 1.1651 -786  
107 1.2698 .893 161 1.2169 839 215 1.1642 785  
108 1.2688 892 162 1.2159 -838 .216 1.1632 784  
109 1.2678 891 163 1.2149 -837 247 1.1622 783  
110 1.2669 .890 -164 1.2139 836 218 1.1612 782  
AL 1.2659 889 -165 1.2130 -835 .219 1.1602 781  
A12 1.2649 888 .166 1.2120 834 .220 1.1593 780  
113 1.2639 887 167 1.2110 833 221 1.1583 779  
114 1.2629 .886 168 1.2100 832 .222 1.1573 -778  
ALS 1.2620 -885 .169 1.2090 831 .223 1.1563 177  
116 1.2610 884 .170 1.2081 -830 .224 1.1553 .176  
117 1.2600 883 171 1.2071 -829 .225 1.1544 775  
118 1.2590 -882 172 1.2061 -828 .226 1.1534 174  
A19 1.2580 881 173 1.2051 827 227 1.1524 173  
.120 1.2571 -880 A174 1.2041 826 228 1.1514 772  
121 1.2561 .879 175 1.2032 .825 -229 1.1504 71  
122 1.2551 -878 176 1.2022 824 .230 1.1495 770  
123 1.2541 877 177 1.2013 823 231 1.1485 -769  
124 1.2531 -876 -178 1.2003 -822 .232 1.1475 -768  
125 1.2522 .875 179 1.1993 -821 .233 1.1465 .767  
-126 1.2512 874 -180 1.1984 .820 234 1.1455 -766  
127 1.2502 873 -181 1.1974 -819 235 1.1446 -765  
-128 1.2492 -872 -182 1.1964 -818 236 1.1436 764  
  
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TABLE OF CORRECTED DIAMETERS FOR REGULAR SIZING TOOL HOLDER  
  
Work Corrected Roll Work Corrected Roll Work Corrected Roll  
Dia. Tool Dia. Dia. Dia. Tool Dia. Dia. Dia. Tool Dia. Dia.  
399” .9852” .6017 453” 9331” .547” .507” .8812”  
.400 -9843 -600 454 -9321 546 -508 .8802  
401 -9833 599 455 -9312 545 509 8792  
402 -9823 598 456 -9302 544 510 .8783  
403 -9813 597 457 9293 543 S11 8773  
404 9803 596 458 -9283 542 512 8764  
405 9794 595 459 -9273 541 S13 8754  
.406 -9784 594 .460 -9264 540 514 .8744  
407 9775 593 461 9254 539 S15 8735  
408 -9765 592 .462 9244 538 .516 8725  
409 .9755 591 463 9234 .537 517 8716  
410 9746 -590 464 9224 536 518 8706  
All 9736 589 465 9215 535 S19 .8697  
412 9727 -588 466 9205 534 .520 .8687  
-413 9717 587 -467 -9196 533 521 .8678  
Al4 9707 586 468 .9186 532 .522 -8668  
415 9698 585 -469 -9176 531 523 8659  
416 -9688 584 -470 -9167 530 .524 .8649  
417 .9678 583 471 -9157 529 525 .8640  
ALS 9668 582 472 9148 528 .526 .8630  
419 -9658 581 473 9138 527 527 8621  
420 9649 .580 474 .9128 526 528 8611  
421 .9639 .579 475 9119 525 529 8601  
422 -9630 .578 476 -9109 524 530 8592  
423 9620 577 477 -9100 523 531 8582  
424 9610 576 478 -9090 522 532 8573  
425 9601 575 479 -9080 521 .533 8563  
426 9591 574 .480 9071 .520 534 8553  
427 9582 .573 481 -9061 519 535 8544  
428 9572 572 482 -9052 518 536 8534  
1429 -9562 S71 483 9042 517 537 8525  
430 9553 .570 484 -9032 516 538 .8515  
431 -9543 569 485 9023 “515 539 .8505  
432 -9534 568 486 -9013 .514 .540 .8496  
433 9524 567 487 -9004 -513 S41 8486  
434 -9514 566 .488 8994 -512 542 .8477  
435 9505 565 489 8984 S11 543 .8467  
436 9495 564 -490 .8975 .510 544 8458  
437 9485 -563 491 8968 .509 545 8448  
438 9475 562 492 -8956 .508 546 .8439  
439 9465 561 493 8946 .507 547 .8429  
.440 -9456 .560 494 -8936 .506 548 .8420  
441 9446 559 495 8927 505 549 8410  
442 9437 558 496 8917 504 550 8401  
443 .9427 557 497 -8908 -503 551 8391  
444 9417 -556 498 -8898 502 552 .8382  
445 -9408 555 .499 -8888 501 553 8372  
446 -9398 554 .500 -8879 -500 554 .8362  
447 .9389 553 501 -8869 555 8353  
448 -9379 552 -502 -8860 -556 8343  
449 .9369 551 -503 -8850 557 8334  
-450 -9360 .550 504 8840 558 -8324  
451 -9350 549 505 -8831 559 8314  
452 -9341 -548 -506 -8821 .560 .8305  
  
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TABLE OF CORRECTED DIAMETERS FOR REGULAR SIZING TOOL HOLDER  
  
Work  
Dia.  
  
237”  
.238  
239  
-240  
  
Corrected  
Tool Dia.  
  
1426”  
1416  
1406  
1397  
1387  
1378  
1368  
1358  
1349  
1339  
1329  
1319  
1309  
1300  
1290  
1280  
1270  
-1260  
1251  
1241  
1231  
1221  
  
ellen eile ed le ia ee ee ee ee  
  
Roll Corrected Roll Work Corrected Roll  
Dia. Tool Dia. Dia. Dia. Tool Dia. Dia.  
-763” 1.0900” -709” 345” 1.0376” 655”  
762 1.0891 -708 -346 1.0366 -654  
-761 1.0881 .707 347 1.0356 653  
.760 1.0871 .706 -348 1.0346 652  
-759 1.0862 .705 349 1.0336 651  
758 1.0852 .704 .350 1.0327 -650  
.757 1.0842 -703 351 1.0317 -649  
-756 1.0832 -702 352 1.0308 648  
-755 1.0822 -701 353 1.0298 647  
754 1.0813 .700 354 1.0288 -646  
-783 1.0803 -699 355 1.0279 645  
.752 1.0794 -698 356 1.0269 .644  
751 1.0784 .697 357 1.0259 643  
.750 1.0774 696 -358 1,0249 -642  
.749 1.0765 -695 359 1.0239 641  
748 1.0755 -694 .360 1.0230 .640  
747 1.0745 .693 361 1.0220 -639  
-746 1.0735 692 .362 1.0211 -638  
745 1.0725 691 363 1.0201 .637  
744 1.0716 690 364 1.0191 636  
743 1.0706 -689 365 1.0182 635  
742 1.0696 -688 .366 1.0172 634  
-741 1.0686 687 .367 1.0162 633  
-740 1.0676 .686 368 1.0152 632  
739 1.0667 685 369 1.0142 631  
.138 1.0657 684 370 1.0133 630  
737 1.0647 683 371 1.0123 629  
736 1.0637 682 372 1.0114 628  
735 1.0627 -681 373 1.0104 .627  
134 1.0618 .680 .374 1.0094 -626  
733 1.0608 .679 375 1.0085 625  
732 1.0599 .678 .376 1.0075 624  
731 1.0589 .677 377 1.0065 623  
.730 1.0579 -676 .378 1.0055 622  
-729 1.0570 .675 .379 1.0045 621  
728 1.0560 -674 380 1.0036 -620  
727 1.0550 -673 381 1.0026 619  
.126 1.0540 .672 382 1.0017 618  
725 1.0530 671 383 1.0007 617  
724 1.0521 .670 384 .9997 .616  
723 1.0511 669 385 -9988 -615  
722 1.0502 -668 386 .9978 .614  
721 1.0492 667 387 -9968 -613  
.720 1.0482 -666 388 9958 612  
719 1.0473 -665 389 -9948 -611  
718 1.0463 .664 .390 -9939 .610  
717 1.0453 663 391 .9929 -609  
-716 1.0443 .662 -392 -9920 .608  
715 1.0433 661 -393 -9910 .607  
714 1.0424 .660 394 .9900 606  
-713 1.0414 659 395 -9891 605  
712 1.0405 658 396 -988t 604  
711 1.0395 657 397 -9872 -603  
710 1.0385 .656 398 -9862 -602  
  
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TABLE OF CORRECTED DIAMETERS FOR REGULAR SIZING TOOL HOLDER  
  
Work Corrected Roll  
Dia. Tool Dia. Dia.  
561” 8295”  
562 8286  
563 -8276  
564 -8266  
565 .8257  
566 -8248  
567 -8238  
568 .8229  
569 -8219  
570 -8210  
S71 -8200  
572 8191  
573 8181  
574 8172  
575 -8162  
576 -8153  
577 8143  
578 8134  
579 8124  
580 -8115  
581 8105  
582 -8096  
.583 8086  
584 .8077  
585 8067 \*  
  
Work  
Dia.  
  
Corrected  
Tool Dia.  
  
Roll  
Dia:  
  
Work  
  
Corrected  
Tool Dia.  
  
Dia. |  
  
Roll  
Dia.  
  
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TABLE OF CORRECTED DIAMETERS FOR OVERSIZE SIZING TOOL HOLDER  
  
A~—#§” Center distance  
B—4§” Center distance  
C—44” Holder opening (See Note \*)  
  
The corrected tool diameters in this table are figured with the tool notched and cutting in the position  
shown in the illustration on page 00.  
  
The maximum sizing tool diameter is 1.3012”, Work Diameter Capacity .187” to .8127.  
  
INSTRUCTIONS  
  
The corrected tool and roll diameters can be taken directly from the table for all work diameters from  
.262” to .812”.  
  
WHEN THE WORK DIAMETER IS UNDER .262”:  
  
When the smallest work diameter is between .262” and .187”, add the difference between .262” and  
the smallest work diameter to be sized to all work diameters and use this new figure to locate the corrected  
diameters in the table. For example:  
  
If the work diameters to be sized are .200”, .230” and .312”, add the difference between .262” and .200”  
‘(.062”) to all work diameters. ,  
  
TABLE  
Work Corrected  
Dia. Tool Dia.  
.200” plus 062”. ............. .262” 1.3012”  
-230” plus .0627............... «292” 1.2718”  
312” plus .0627.............-. 374” 1.1915”  
  
When it is necessary to compensate for the tool diameter, as explained above, always add this difference  
to the roll diameter that is rolling on the work. This will keep the spread of the holder (A and B) between  
tool and roll approximately the same and will keep the amount of adjustment in the holder constant. For  
example: If in the example above, the roll was rolling on the .230” diameter, add the difference of .062” to  
the actual roll diameter of .958”.  
  
.594” (B) minus .115” = .479” x 2 = .958” actual roll dia.  
-958” plus .062” = 1.020” roll diameter  
  
When using the Oversize Holder, it will be impossible to face to center of the work, as .187” is the  
minimum work diameter that can be sized.  
  
\*The holder opening (C) does not permit work from .656” to .812” diameter to extend from the chuck  
beyond the cutting tool.  
  
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## Page 107

TABLE OF CORRECTED DIAMETERS FOR OVERSIZE SIZING TOOL HOLDER  
  
Work Corrected Roll Work Corrected Roll Work Corrected Roll  
Dia. Tool Dia. Dia. Dia. Tool Dia. Dia. Dia. Tool Dia. Dia.  
.262” 1.3012” .925” -316” 1.2482” .871” .370” 1.1954” .817”  
.263 1.3002 924 .317 1.2473 .870 371 1.1944 -816  
264 1.2992 -923 318 1.2463 -869 372 1.1935 815  
265 1.2982 -922 319 1.2453 -868 373 1.1925 814  
.266 1.2972 921 .320 1.2443 -867 374 1.1915 813  
.267 1.2963 -920 321 1.2433 866 375 1.1905 812  
.268 1.2953 -919 .322 1.2424 865 .376 1.1895 811  
.269 1.2943 -918 .323 1.2414 864 377 1.1886 .810  
.270 1.2933 -917 324 1.2404 863 .378 1.1876 809  
271 1.2923 -916 .325 1.2394 .862 .379 1.1866 1808  
.272 1.2914 -915 326 1,2384 861 .380 1.1856 -807  
.273 1.2904 914 327 1.2375 .860 381 1.1846 .806  
.274 1.2894 913 328 1.2365 .859 382 1.1837 80S  
.275 1.2884 912 329 1.2355 858 -383 1.1827 804  
.276 1.2874 911 .330 1.2345 .857 384 1.1817 803  
.277 1.2865 910 331 1.2335 856 385 t.1807 .802  
.278 1.2855 -909 .332 1.2326 .855 386 1.1797 801  
.279 1.2845 -908 333 1.2316 854 387 1.1788 .800  
.280 1.2835 -907 334 1.2306 .853 388 1.1778 .199  
281 1.2825 -906 335 1.2296 852 389 1.1768 .798  
282 1.2816 .905 336 1.2286 851 390 1.1758 197  
283 1.2806 -904 337 1.2277 -850 391 1.1748 796  
284 1.2796 903 338 1.2267 849 392 1.1739 795  
285 1.2786 -902 339 1.2257 848 393 1.1729 794  
.286 1.2776 -901 .340 1.2247 847 394 1.1719 .793  
.287 1.2767 -900 341 1.2237 846 395 1.1709 .792  
.288 1.2757 899 342 1.2228 845 396 1.1699 791  
289 1.2747 898 343 1.2218 844 397 1.1690 790  
290 1.2737 897 344 1.2208 843 398 1.1680 .789  
291 1.2727 896 345 1.2198 842 399 1.1671 788  
292 1.2718 -895 346 1.2188 841 -400 1.1661 787  
293 1.2708 894 -347 1.2179 .840 401 1.1651 1786  
294 1.2698 893 -348 1.2169 839 -402 1.1642 785  
.295 1.2688 -892 .349 1,2159 838 -403 1.1632 784  
.296 1.2678 891 -350 1.2149 .837 -404 1.1622 -783  
.297 1.2669 -890 351 1.2139 836 -405 1.1612 782  
298 1.2659 889 352 1.2130 835 -406 1.1602 781  
.299 1.2649 -888 353 1.2120 834 407 1.1593 -780  
300 1.2639 .887 354 1.2110 .833 -408 1.1583 779  
301 1.2629 -886 355 1.2100 -832 -409 1.1573 778  
.302 1.2620 -885 .356 1.2090 831 410 1.1563 177  
303 1.2610 -884 .357 1.2081 -830 All 1,1553 -176  
304 1.2600 883 358 1.2071 .829 412 1.1544 175  
.305 1.2590 -882 359 1.2061 828 413 1.1534 774  
306 1.2580 881 .360 1.2051 -827 414 1.1524 173  
.307 1.2571 .880 361 1.2041 826 41S 1.1514 772  
308 1.2561 .879 -362 1.2032 825 -416 1.1504 771  
.309 1.2551 .878 -363 1.2022 -824 AN7 1.1495 .770  
310 1.2541 .877 .364 1.2013 .823 418 1.1485 -769  
311 1.2531 .876 -365 1.2003 822 -419 1.1475 768  
312 1.2522 875 366 1.1993 821 420 1.1465 -767  
313 1.2512 .874 367 1.1984 .820 421 1.1455 -166  
314 1.2502 873 368 1.1974 819 -422 1.1446 -765  
315 1.2492 872 -369 1.1964 818 423 1.1436 -764  
  
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TABLE OF CORRECTED DIAMETERS FOR OVERSIZE SIZING TOOL HOLDER  
  
Corrected Roll Work Corrected Corrected Roll  
Tool Dia. Dia. Dia. Tool Dia. Tool Dia. Dia.  
1.1426” 763” 478” 1.0900” 1.0376” .655”  
1.1416 762 -479 1.0891 1.0366 -654  
1.1406 -761 -480 1.0881 1.0656 653  
1.1397 .760 481 1.0871 1.0346 652  
1.1387 759 -482 1.0862 1.0336 -651  
1.1378 758 -483 1.0852 1.0327 -650  
1.1368 WEY 484 1.0842 1.0317 .649  
1.1358 756 -485 1.0832 1.0308 -648  
1.1349 755 -486 1.0822 1.0298 -647  
1.1339 754 487 1.0813 1.0288 -646  
1.1329 753 488 1.0803 1.0279 645  
1.1319 752 489 1.0794 1.0269 .644  
1.1309 751 .490 1.0784 1.0259 -643  
1.1300 -750 ADL 1.0774 1.0249 642  
1.1290 749 492 1.0765 1.0239 -641  
1.1280 -748 -493 1.0755 1.0230 -640  
1.1270 «747 A94 1.0745 1.0220 -639  
1.1260 .746 495 1.0735 1.0211 638  
1.1251 745 496 1.0725 1.0201 .637  
1.1241 -744 497 1.0716 1.0191 -636  
1.1231 .743 498 1.0706 1.0182 635  
1.1221 742 499 1.0696 1.0172 634  
1.1211 741 .500 1.0686 1.0162 633  
1.1202 .740 501 1.0676 1.0152 632  
1.1192 .739 .502 1.0667 1.0142 -631  
1.1183 .738 503 1.0657 1.0133 -630  
1.1173 737 504 1.0647 1.0123 629  
1.1163 .736 .505 1.0637 1.0114 628  
1.1154 735 .506 1.0627 1.0104 627  
1.1144 734 .507 1.0618 1.0094 -626  
1.1134 -733 -508 1.0608 1.0085 625  
1.1124 732 509 1.0599 1.0075 -624  
1.1114 731 .510 1.0589 1.0065 -623  
1.1105 .730 Sth 1.0579 1.0055 «622  
1.1095 729 512 1.0570 1.0045 -621  
1.1085 728 513 1.0560 1.0036 -620  
1.1075 727 -514 1.0550 1.0026 -619  
1.1065 726 51S 1.0540 1.0017 -618  
1.1056 725 .516 1.0530 1.0007 -617  
1.1046 -724 517 1.0521 .9997 -616  
1.1037 723 .518 1.0511 9988 615  
1.1027 .722 .519 1.0502 .9978 -614  
1.1017 721 520 1.0492 -9968 -613  
1.1008 .720 521 1.0482 -9958 -612  
1.0998 -719 .522 1.0473 .9948 611  
1.0988 718 523 1.0463 -9939 -610  
1.0978 47 524 1.0453 : 9929 -609  
1.0968 716 -528 1.0443 -662 -579 -9920 608  
1.0959 15 -526 1.0433 661 .580 -9910 -607  
1.0949 714 -527 1.0424 -660 581 -9900 -606  
1.0939 -713 -528 1.0414 659 582 9891 -605  
1.0929 -712 .529 1.0405 658 583 -9881 -604  
1.0919 Tit .530 1.0395 -657 584 -9872 -603  
1.0910 .710 531 1.0385 .656 585 -9862 -602  
  
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TABLE OF CORRECTED DIAMETERS FOR OVERSIZE SIZING TOOL HOLDER  
  
Work Corrected Roll Work Corrected Roll Work Corrected Roll  
Dia. Tool Dia. Dia. Dia. Tool Dia. Dia. Dia. Tool Dia. Dia.  
.586” -9852” -601” -640” -9331” -547” -694” .8812” -500”  
587 -9843 -600 -641 -9321 -546 -695 .8802 .500  
588 -9833 599 -642 -9312 545 .696 .8792 .500  
.589 -9823 598 643 -9302 544 .697 -8783 .500  
.590 9813 597 -644 -9293 543 698 .8773 .500  
591 -9803 -596 -645 -9283 .542 -699 -8764 .500  
592 -9794 595 -646 .9273 541 .700 8754 -500  
.593 -9784 594 -647 9264 -540 701 8744 -500  
594 9775 593 -648 .9254 539 .702 8735 -500  
595 -9765 .592 649 .9244 538 .703 -8725 .500  
-596 .9755 591 -650 -9234 537 .704 .8716 .500  
597 -9746 .590 -651 .9224 536 .705 .8706 .500  
-598 -9736 589 652 -9215 535 .706 .8697 .500  
.599 9727 .588 -653 .9205 534 .707 .8687 .500  
-600 9717 .587 654 -9196 533 .708 -8678 .500  
-601 .9707 .586 -655 -9186 .532 .709 -8668 .500  
-602 -9698 585 -656 .9176 531 710 -8659 .500  
-603 9688 584 .657 -9167 530 71 -8649 .500  
-604 9678 583 -658 9157 .529 712 .8640 .500  
605 9668 .582 .659 9148 528 713 -8630 .500  
-606 9658 581 -660 9138 527 714 8621 .500  
.607 9649 580 661 9128 .526 L715 -8611 500  
-608 9639 579 -662 9119 525 .716 8601 .500  
609 9630 578 -663 9109 524 117 8592 -500  
-610 9620 577 -664 9100 523 -718 -8582 .500  
611 9610 .576 -665 9090 .522 719 8573 .500  
-612 -9601 575 -666 -9080 521 .720 8563 .500  
613 9591 574 .667 9071 .520 721 8553 .500  
614 9582 573 668 -9061 519 722 8544 .500  
615 9572 572 -669 -9052 518 723 8534 -500  
-616 -9562 S71 -670 -9042 517 .724 8525 .500  
617 -9553 .570 -671 -9032 516 725 8515 .500  
-618 9543 .569 -672 -9023 S15 .726 8505 .500  
-619 9534 568 .673 .9013 514 727 -8496 .500  
.620 .9524 567 .674 9004 513 728 -8486 .500  
621 -9514 566 .675 8994 512 729 8477 .500  
622 9505 .565 .676 -8984 S11 .730 8467 -500  
-623 9495 564 .677 .8975 510 731 8458 .500  
624 9485 -563 .678 8965 .509 732 -8448 .500  
-625 9475 562 -679 8956 -508 733 8439 .500  
-626 9465 S61 -680 8946 .507 734 8429 -500  
-627 -9456 -560 -681 -8936 .506 735 -8420 -500  
628 -9446 .559 -682 -8927 505 .736 -8410 .500  
-629 9437 -558 -683 8917 504 737 -8401 .500  
-630 9427 557 -684 8908 503 738 8391 .500  
-631 9417 -556 -685 -8898 502 .739 -8382 -500  
.632 -9408 -555 -686 -8888 501 .740 .8372 .500  
-633 9398 -554 -687 -8879 .500 741 -8362 .500  
-634 9389 553 688 -8869 .500 742 -8353 .500  
-635 9379 -552 .689 8860 500 743 .8343 .500  
-636 9369 S51 .690 8850 .500 744 8334 -500  
-637 9360 .550 -691 -8840 -500 TAS 8324 -500  
-638 -9350 -549 -692 8831 -500 746 -8314 .500  
-639 -9341 -548 -693 -8821 .500 747 .8305 -500

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TABLE OF CORRECTED DIAMETERS FOR OVERSIZE SIZING TOOL HOLDER  
  
Work Corrected Roll Work Corrected Roll Work Corrected Roll  
Dia. Tool Dia. Dia. Dia. Tool Dia. Dia. Dia. Tool Dia. Dia.  
748” .8295” -500” .802” .7782” -500”  
«749 -8286 .500 -803 7772 -500  
«750 -8276 .500 -804 -7763 .500  
754 8266 .500 805 -7753 -500  
752 8257 -500 -806 7744 -500  
753 .8248 -500 .807 7735 .500  
«754 .8238 .500 -808 «7725 -500  
«755 8229 .500 -809 .7716 -500  
-756 -8219 .500 -810 -7706 -500  
157 .8210 .500 811 -7697 .500  
.758 -8200 500 -812 -7688 .500  
159 -8191 .500  
760 8181 .500  
761 8172 .500  
-762 8162 .500  
763 -8153 .500  
164 8143 .500  
765 8134 .500  
166 8124 .500  
767 8115 .500  
768 8105 .500  
169 -8096 .500  
170 .8086 500  
71 .8077 500  
772 .8067 500+  
173 8058 .500  
774 8048 .500  
175 -8039 .500  
776 8029 .500  
77 -8020 .500  
778 -8010 .500  
779 .8000 .500  
-780 7991 .500  
781 -7981 500  
782 -7972 .500  
783 .7962 .500  
784 7953 .500  
785 7943 500  
-786 7934 -500  
787 -7925 .500  
788 -7915 .500  
.789 7905 .500  
.790 7896 -500  
791 7886 .500  
792 7877 -500  
793 7867 -500  
794 7858 -500  
795 -7848 .500  
796 -7839 -500  
197 7830 .500  
798 -7820 .500  
.799 -7810 500  
800 -7801 -500  
801 7791 .500  
  
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NOTES  
  
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PRINCIPAL DIMENSIONS  
These dimensions apply to the Model B Standard Bed Machine.  
A - 2-1/8" Minimum distance from chuck to end of tool spindle when  
on the high point of a standard Turn and Drill Cam (7-1/2"  
diameter) and with the turnbuckle adjustment extended.  
  
A - 2-7/8" if a standard Form and Cutoff Cam is substituted (6"  
diameter) .  
  
A - 2-9/16" if an oil sleeve is being used on the tool spindle.  
NOTE - A special oil sleeve can be purchased which will fit  
around the tool spindle between bearings and is used to force  
cutting oil directly through the tool spindle. This is used  
especially with Hollow Mills.  
  
B - 4-13/16" Maximum distance from chuck to end of tool spindle be-  
fore tool clamping collar will strike bearing.  
  
Cc - 1-3/8" Maximum turnbuckle adjustment.  
  
D - 1" End of tool spindle to end of tool clamping collar.  
  
D - 25/32" End of threading spindle to end of tool clamping collar.  
E - 3/4" Hole in all tool and threading spindles.  
  
F - 1-3/8" Diameter of tool spindle.  
  
F - 1/1-8" Diameter of threading spindle.  
  
G - 2-3/8" Diameter of tool clamping collar on tool spindle.  
  
G - 1-7/8" Diameter of tool clamping collar on threading spindle.  
  
H ~- 1-1/8" Maximum side adjustment of tool post.  
  
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MODEL B MACHINE WITH THREADING  
75 Cycle - 60 Cycle - 45 Cycle  
6:1 THREADING METHOD TABLE  
(Formerly Steel Threading Method)  
  
Threading Change Gears - 32 T. Driver, 32 T. Driven  
  
Table for selecting steel threading cam and location of block on threading cam lever  
for right hand threads only. Ratio of work spindles to threading spindles is 4 to 3  
going on and 1 to IF coming off.  
  
Select number of effective rev's of spindle  
in table which is nearest number required to  
complete piece.  
  
Upper figure in each square denotes number  
of cam to be used. Lower figure denotes  
position of block on threading cam lever,  
  
Effec. rev's of  
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## Page 135

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## Page 137

6:1 THREADING TABLE  
  
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RISE AND DROP OF 6:1 THREADING CAMS  
ARE AS FOLLOWS:  
  
RISE HUNDREDTHS  
  
1 -118" 0 to 323  
  
r +200" 0 to 328  
3 317" z +366" | 323 to 50 |  
4 .452" 540" | 322 to 50  
  
5 715" 0 to 323  
  
6 1.140" 0 to 323 1.320" 324 to 50  
  
id 1.740" Oto 323 | 2.100" 32% to 50  
  
8 | 2.000" 8% to 323 | 2.000" | 323 to 434  
  
9 2.000" 163 to 323 2.000" 323 to 393  
| a aan  
  
10 | 2.000" | 22% to 323 2,000" | 323 to 37  
  
ll 2.000" 27 to 323 2.000" 32g to 35%  
  
Page 140

## Page 139

To Cut Left Hand Threads using 6:1 threading method (formerly steel  
  
threading method) for 75 cycle, 60 cycle, or 45 cycle machines with  
30 T. driver - 34 T. Driven threading change gears:  
  
Formulas for figuring the number of threads that can be cut,  
rise of cam necessary and correct location of cam lever block, after  
the effective revolutions to complete one piece have been determined  
are as follows:  
  
1 - Effective revolutions to complete one piece divided by 6  
equals number of threads that can be cut.  
  
2 ~- Number of threads that can be cut divided by number of  
threads per inch equals rise of cam necessary. (Adjust cam lever  
block to allow tap or die to pull out slightly.)  
  
Select a threading cam from the list below, with a rise near-  
est to the rise of the necessary cam.  
  
3 - Divide rise of necessary cam by actual rise on threading  
cam selected to obtain location of cam lever block.  
  
For example, if the effective revolutions to complete the  
piece is 90 and the number of threads per inch is 32:  
  
1 - 90 divided by 6 equals 15 threads that can be cut.  
2 - 15 divided by 32 equals .468"  
-468" minus 10% (.047") equals .421" rise of cam  
necessary.  
  
Select a cam with a rise nearest to .421", which is a #2  
cam with a rise of .389".  
  
3 - .421 divided by .489" equals 1.08 location of cam lever  
block.  
  
2:1 THREADING CAMS (Formerly Brass Threading Cams)  
  
CAM # RISE 100ths DROP 100ths PART #  
1 -238" 0-25 -276" 25-50 5-C-82  
2 -389" 0-25 -450" 25-50 5-C-84  
3 560 0-25 -657" 25-50 5-C-86  
4 +675" 0-25 782" 25-50 5-C-88  
5 1.095" 0-25 1.265" 25-50 5-C-90  
6 1.525" 0-25 1.770" 25-50 5-C-92  
7 2.000" 5-25 2.000" 25-4235 5-C-94  
8 2.000" 12-25 2.000" 25-37 5~-C-80  
  
Page 141

## Page 140

METHOD TABLE  
  
(Formerly Steel Threading Method)  
  
THREADING CHANGE GEARS - 32 T. DRIVER, 32 T. DRIVEN  
  
75 Cycle - 60 Cycle - 45 Cycle  
6:1 THREADING  
  
MODEL B MACHINE WITH THREADING  
  
Ratio of work spindles to threading spindles is to 3  
  
Table for selecting steel threading cam and location of block on threading cam lever  
going on and 1 to 1-1/2 coming off.  
  
for right hand threads only.  
  
Sal  
  
Lower figure denotes  
  
in table which is nearest number required to  
  
Select number of effective rev's of spindle  
complete piece.  
  
Upper figure in each square denotes number  
  
of cam to be used.  
position of block on threading cam lever.  
  
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## Page 145

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MODEL B OVERSIZE MACHINE - With Threading - 60 Cycle  
2:1 THREADING METHOD TABLE (Formerly Brass Method)  
  
Work Spindle Speed 2400 r.p.m., Gears 42 T. Driver, 21 T. Driven  
Threading Change Gears 36 T. Driver, 27 T. Driven  
  
Table for selecting brass threading cam and location of block on threading cam lever  
for right and left\_hand threads. Threading spindle does not revolve when tap or die  
is running on to work, but runs twice the speed of work spindles, in the same direc-  
tion, when running off (right hand threads only). Threading spindle revolves twice  
the speed of the work spindles, in the same directions, when tap or die is running on  
to work, but is stopped when running off (left hand threads only).  
  
Select number of effective rev's of spindle  
in table which is nearest number required to  
complete piece.  
  
Upper figure in each square denotes number  
of cam to be used. Lower figure denotes po-  
sition of block on threading cam lever.  
  
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## Page 146

MODEL B OVERSIZE MACHINE - With Threading - 45 Cycle  
2:1 THREADING METHOD TABLE (Formerly Brass Method)  
Work Spindle Speed 2384 r.p.m., Gears 46 T. Driver, 18 T. Driven  
Threading Change Gears 36 T. Driver, 27 T. Driven  
  
Table for selecting brass threading cam and location of block on threading cam lever  
for right\_and left hand threads. Threading spindle does not revolve when tap or die  
is running on to work, but runs twice the speed of work spindles, in the same direc-  
tion, when running off (right hand threads only). Threading spindle revolves twice  
  
the speed of the work spindles, in the same directions, when tap or die is running on  
to work, but is stopped when running off (left hand threads only).  
  
Select number of effective rev's of spindle  
in table which is nearest number required to  
  
”  
. {3316 Z| complete piece.  
a | 3 )  
a) Fs 2°? Upper figure in each square denotes number  
z . = & of cam to be used. Lower figure denotes po-  
8 g 38 sition of block on threading cam lever.  
  
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MODEL B MACHINE WITH THREADING  
75 Cycle  
2: THREADING METHOD TABLE  
(Formerly Brass Threading Method)  
  
Work Spindle Speed 2500 R.P.M., Gears 40 T. Driver, 24 T. Driven  
Threading Change Gear 36 T. Driver, 27 T. Driven  
  
Table for selecting brass threading cam and location of block on threading cam lever  
  
for right or left hand threads. Threading spindle does not revolve when tap or die  
  
is running on to work, but runs twice the speed of work spindles, in the same direc-  
tion, when running off (right hand threads only). Threading spindle revolves twice  
the speed of work spindles, in the same direction, when tap or die is running on to  
  
work but is stopped when running off (left hand threads only).  
  
Select number of effective rev's of spindle  
in table which is nearest number required  
to complete piece.  
  
Upper figure in each square denotes number  
of cam to be used. Lower figure denotes  
position of block on threading cam lever.  
  
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MODEL B MACHINE WITH THREADING  
60 Cycle  
2:1 Threading Method Table  
(Formerly Brass Threading Method)  
  
Work Spindle Speed 2400 R.P.M., Gears 42 T. Driver, 21 T. Driven  
Threading Change Gears 36 T. Driver, 27 T. Driven  
  
Table for selecting brass threading cam and location of block on threading cam lever  
  
for right and left hand threads. Threading spindle does not revolve when tap or die  
is running on to work, but runs twice the speed of work spindles, in the same direc-  
tion, when running off (right hand threads only). Threading spindle revolves twice  
  
the speed of the work spindles, in the same direction, when tap or die is running on  
to work, but is stopped when running off (left hand threads only).  
  
Select number of effective rev's of spindle  
in table which is nearest number required to  
complete piece.  
  
Upper figure in each square denotes number  
of cam to be used. Lower figure denotes po-  
sition of block on threading cam lever.  
  
Piece  
Effec. Rev's of  
Spin.Per Piece  
No of Threads  
That Can Be Cut  
  
Pitch in Millimeters  
  
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## Page 149

MODEL B OVERSIZE MACHINE ~ With Threading 45 Cycle  
(2:1 THREADING METHOD TABLE (Formerly Brass Method)  
Work Spindle Speed 2384 r.p.m., Gears 46 T. Driver, 18 T. Driven  
Threading Change Gears 36 T. Driver, 27 T. Driven  
  
Table for selecting brass threading cam and location of block on threading cam lever  
for right and left hand threads. Threading spindle does not revolve when tap or die  
is running on to work, but runs twice the speed of work spindles, in the came direc-  
tion, when running off (right hand threads only). Threading spindle revolves twice  
the speed of the work spindles, in the same directions, when tap or die is running on  
to work, but is stopped when running off (left hand threads only).  
  
Select number of effective rev's of spindle  
in table which is nearest number required to  
complete piece.  
  
Upper figure in each square denotes number  
of cam to be used. Lower figure denotes po-  
sition of block on threading cam lever.  
  
. rev's of  
  
Pitch in Millimeters  
  
Seconds Per  
No. of threads  
that can be cut  
  
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## Page 150

6:1 THREADING CAMS (Formerly Steel)  
PT Rise DROP  
INCH 100ths INCH Tom | 100ths  
  
[mm |  
Com [ese [am | oom |  
317 8.0518 ozs | see | o.2960\_| 32-5-50  
  
50.8000 22.5-32.5 | 2.000 | 50.8000 32. 5-37  
50.8000 27-32.5 | 2.000 | 50.8000  
  
2:1 THREADING CAMS (Formerly Brass)  
  
DROP  
100ths INCH [| MM \_\_\_]\_100ths  
  
Cow [nw [oe |  
1.265 32.1310  
1.770 44,9580  
  
50.8000 25-37  
  
PART #  
  
5-C-118  
  
=  
  
5-C-98  
  
5-C-100  
  
5-C-102  
  
5-C-104  
  
5-C-106  
  
5-C-108  
  
5-C-110  
  
5-C-112  
  
5-C-114  
  
5-C-116  
  
CAM  
  
INCH PART #  
  
5-C-82  
  
. 389 9.8806 5-C-84  
  
5-C-86  
  
uw  
a  
o  
  
75 5-C-88  
  
27.8130 5-C-90  
  
38.735 5-C-92  
  
50.8000 5-C-94  
  
2.000 50.8000 5-C-80

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TROUBLE SHOOTING  
  
1 - When Form Tool Diameter Changes Size, Varies or Chatters.  
  
a. Check for maximum rigidity in tool set-up and head  
locking.  
la. Check for sloppy tool or work spindle bearings.  
2a. Check for proper hook in tool and on center.  
3a. Proper work support if necessary.  
  
b. Check for loose slide or tool arm bushing.  
  
c. See if all bolts are tight.  
  
d. Check stop screw pressure (.005 pressure would be  
-010 on diameter of piece, this should be enough.)  
  
e. Dull tool.  
  
2 - When the hole gets big.  
a. Head locking properly.  
b. Sloppy spindles.  
c. Center drill, chipped or off center.  
d. Check if drill is dull or loaded.  
e. Check drill alignment and spindle alignment.  
  
3 - When threads come out stripped.  
a. See if proper cam is used.  
b. Check block location for proper rises.  
c. Check proper clutch shifting.  
d. Check for excess wobble in tap or die.  
e. Check threading clutch torque.  
£. Check if hole or body size is correct.  
g- Spindle is out of line.  
h. Dull, loaded up, tap or die.  
  
4 - Variation in length.  
  
a. Check head thrust and thrust bearings end play.  
  
b. Worm or sloppy bearings in spindle.  
  
c. Dull end working tools pushing work back into collets,  
such as drills, broaches, and etc.  
  
d. Loose, worn, or dirty collets.  
  
e. Check for equal feed finger pressure.  
  
£. Check for clean cutoff on bar end.  
  
g. Stock stop should be tight, highly polished, and  
proper length of stop plate.  
  
h. Check for worn rolls and pins on end working cam lever.  
  
5 - When parts have burr on cutoff.  
a. Check for proper pressure on stop collar (1263-101-14-1)  
on the burring spindle.  
b. Check timing of closing dogs so burring chuck is closing  
at proper time.  
c. Check rolls and pins on cam levers.  
d. Cutoff above or below center.  
  
6 - When box tool dimension is rough or varies in size.  
a. Check for proper grind on box tool.  
b. Check for proper feed.  
c. Check rollers for proper tension.  
  
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## Page 152

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When  
a.  
b.  
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When  
a.  
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hollow mill dimension is rough or varies in size.  
Check for proper grind.  
  
Worn or loaded cutting edges.  
  
Check for proper alignment (work piece to mill).  
Check for proper feed.  
  
improper step or shoulder appears.  
  
Check form tools for alignment.  
  
Check box tools for alignment or distance of travel.  
Check if drills are of proper depth and sharpness.  
Check for loose tool holders.  
  
If rolled threads are out of form or flaky (scissor type).  
  
a.  
b.  
c.  
d.  
  
e.  
f.  
  
Check feed or penetration of work.  
  
Check proper blank size.  
  
Check blank for taper.  
  
Check when on high point of cam that rolls and work  
are on this same center.  
  
Check for proper roll synchronization.  
  
Check for nicks.  
  
If reamer chatters.  
  
a.  
b.  
  
c.  
d.  
  
Too much clearance on sprial relief.  
  
All reamers should be able to float, but tension on  
float should be controlled. Therefore, check for proper  
alignment and float tension.  
  
Make sure feed is right for size of reamer.  
  
Check for low cutting edges.  
  
If tap trouble.  
  
a.  
  
b.  
c.  
  
d.  
  
If tap is cutting under size, low cutting edges  
  
(flute out tap) after tapping part, part should  
  
be able to be threaded on tap by hand.  
  
Check timing on the threading clutch shifting.  
  
Check radial torque on threading clutch (use torque  
wrench) See MB-226-SA - Sheet #3.  
  
When checking torque make sure you can feel the chatter  
(If not it is possible the key in the clutch body may  
be sheared).  
  
12- If knurl is out of form or flaky.  
  
a.  
b.  
c.  
d.  
  
Make sure blank is correct size.  
  
Check feed of penetration of work.  
Check blank for taper.  
  
Examine knurl pins and knurls for wear.  
  
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## Page 153

PREVENTIVE MAINTENANCE  
  
This is only a guide. Actual production conditions may require  
more or less preventive maintenance. A good maintenance program re-  
quires the cooperation of all. Preventive maintenance can save cost  
by reducing "down time", rejected parts, and other small problems.  
  
Operators Care of the Machine:  
  
1 - Check lube oil in sight glass at beginning of shift. Fill if  
necessary.  
  
2 - Oil all oil fittings with oil gun every shift.  
  
3 - At the beginning of each shift, check to be sure there is  
adequate coolant flow to all tooling cutting edges and coolant  
flow is directed away from the work spindles.  
  
4 - Wipe the bars clean of dirt and grit before loading them into  
the machine. Wipe with oily rag to reduce noise and load on  
feeding mechanism.  
  
5 - Be sure both ends of all bars are chamfered before loading them  
into the machine for easier entry into pushers and collets (chucks).  
  
6 ~ At the end of each shift, turn power to the machine to "Jog off".  
Wipe or brush all chips and grit away from slides, gibs, and  
tool holders. Do Not use an air hose. High pressure air is  
dangerous and drives grit into the slides, gibs and other  
mechanisms; which prevents proper operation.  
  
7 - Do not operate machine with improperly adjusted clutches. Notify  
your supervisor.  
  
8 ~ NEVER ATTEMPT TO FORCE THE MACHINE TO OPERATE. In case of hang  
up, twisted cam shaft, or any other malfunction, turn machine off  
and notify your supervisor.  
  
9 - Check collet (chuck) adjustment when loading new bars and re-  
adjust if necessary.  
  
10 - Check condition of cam rolls and pins each time cams are changed.  
ll - Keep machine and floor area around the machine free from accumu-  
lated oil, dirt and debris.  
  
Daily Maintenance  
  
Check:  
  
1 - Lubricating oil level in main reservoir.  
  
2 ~ Coolant level in pan reservoir.  
  
3 - Coolant intake pipe (or Pump) screen; clean if necessary.  
  
4 - Condition and alignment of stock reel and stock reel support.  
(This should be lagged to floor).  
  
- Lubricating oil delivery to spindle bearings.  
  
- Brake adjustment.  
  
aun  
  
Bi-Weekly Maintenance  
  
1 - Visually inspect and hand feel high speed and starting clutches.  
2 - Check radial torque on threading clutch. (Use torque wrench).  
See MB-226-SA, sheet #3. Also check for neutral approximately  
1/4" of play.  
3 - Check locking nuts on spindle change gear shafts.  
4 - Check revolving head for end play and adjust thrust ring if necessary.  
  
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Monthly Maintenance  
  
Remove the following items from the revolving head, clean throughly,  
inspect and replace:  
  
- Collets (chucks)  
- Inner Spindle  
  
- Feed Fingers  
  
- Feed Tubes  
  
Bm WN bh  
  
Inspect condition of:  
  
1 - Outer spindle and clean internally with boiler brush  
2 - Stop Screws  
  
3 - Cross Slide and Gib Adjustment  
  
Inspect wear and/or damage condition of:  
  
1 - Stock Reel  
  
2 - Stock Reel Stand  
  
3 - Locating Lever (to assure it is locking correctly and roll is  
turning)  
  
4 - Chuck Slide, Roll, and Pin  
  
Check wear and/or damage of:  
  
1 - Spanner Nuts  
  
2 - Bearings  
  
3 - Rollaway Clutch  
  
4 - Gears (tooth wear and mounting)  
5 - Shafts  
  
6 - Chuck and Feed Cam Shaft  
  
Check for:  
1 - Twisted Front Cam Shaft (the locating lever must clear the locating  
blocks (724-1) on index and make contact on the angle side first when  
  
locking with approximately .012 push back.)  
  
Quarterly Maintenance  
  
1 - Remove coolant from the pan and throughly clean pan of sediment  
and fine chips. Add new coolant.  
  
2 - On long runs, where the cams are seldom changed, remove cross  
slides and clean, then check cross slide gib adjustments.  
  
3 - Plugs at the bottom of the worm housing should be removed and  
the housing flushed out with an OSHA approved solvent. Replace  
the plugs and fill with fresh oil.  
  
Semi-Annual Maintenance  
  
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t  
  
Drain, clean, flush, and refill main lube oil reservoir. Check  
condition of filter.  
  
- Check for excessive end play of revolving head.  
  
- Check for excessive looseness of work spindles.  
  
Check for excessive looseness of tool spindles.  
  
- Check for excessive end play of thrust bearings.  
  
- Check condition of electrical controls: switches, solenoid valves,  
wiring, panel box, and motors. NOTE - ELECTRICAL MAINTENANCE  
SHOULD BE BY AUTHORIZED PERSONNEL ONLY.  
  
7 - Check main drive belt tension.  
  
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Annual Maintenance  
  
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On the roll clutch, inspect rolls, spring and rolling surfaces.  
Replace any worn parts. Clean, lubricate, and reassemble.  
Check attachment for alignment with work spindles.  
  
Check for broken cross slides.  
  
Check condition of all levers, rolls and pins.  
  
Check condition of stock stop.  
  
Check condition of chip conveyor.  
  
Check condition of lubricating and coolant systems:  
  
1 ~ Lubricating Pump and Drive Belt  
  
2 ~ Coolant Pump and Drive Chain  
  
3 - Lubricating Lines and Meter Units  
  
4 - Filter in Coolant Tank  
  
Inspect condition of attachments:  
  
1 - Threading Attachments  
  
2 - Stationary Head Burring Attachment  
  
3 - Center Drive Attachment  
  
4 - Any other special Attachments.  
  
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