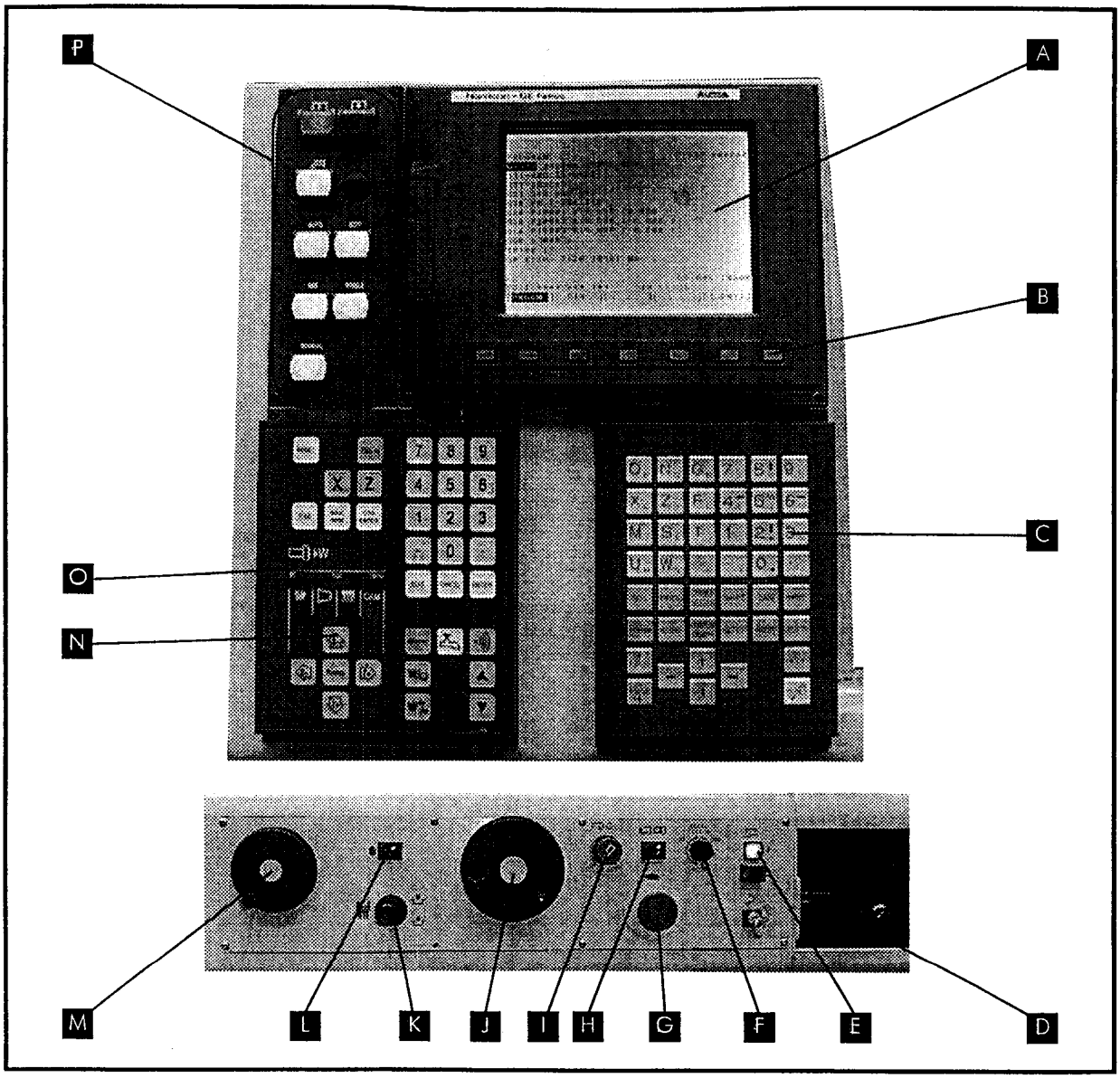
ALPHA S PLUS

'HANDS ON TUTORIAL'

THIS SIMPLE PROGRAMME OF WORK HAS BEEN DESIGNED AS A FAMILIARISATION EXERCISE FOR FIRST TIME USERS OF THE HARRISON ALPHA SERIES LATHE

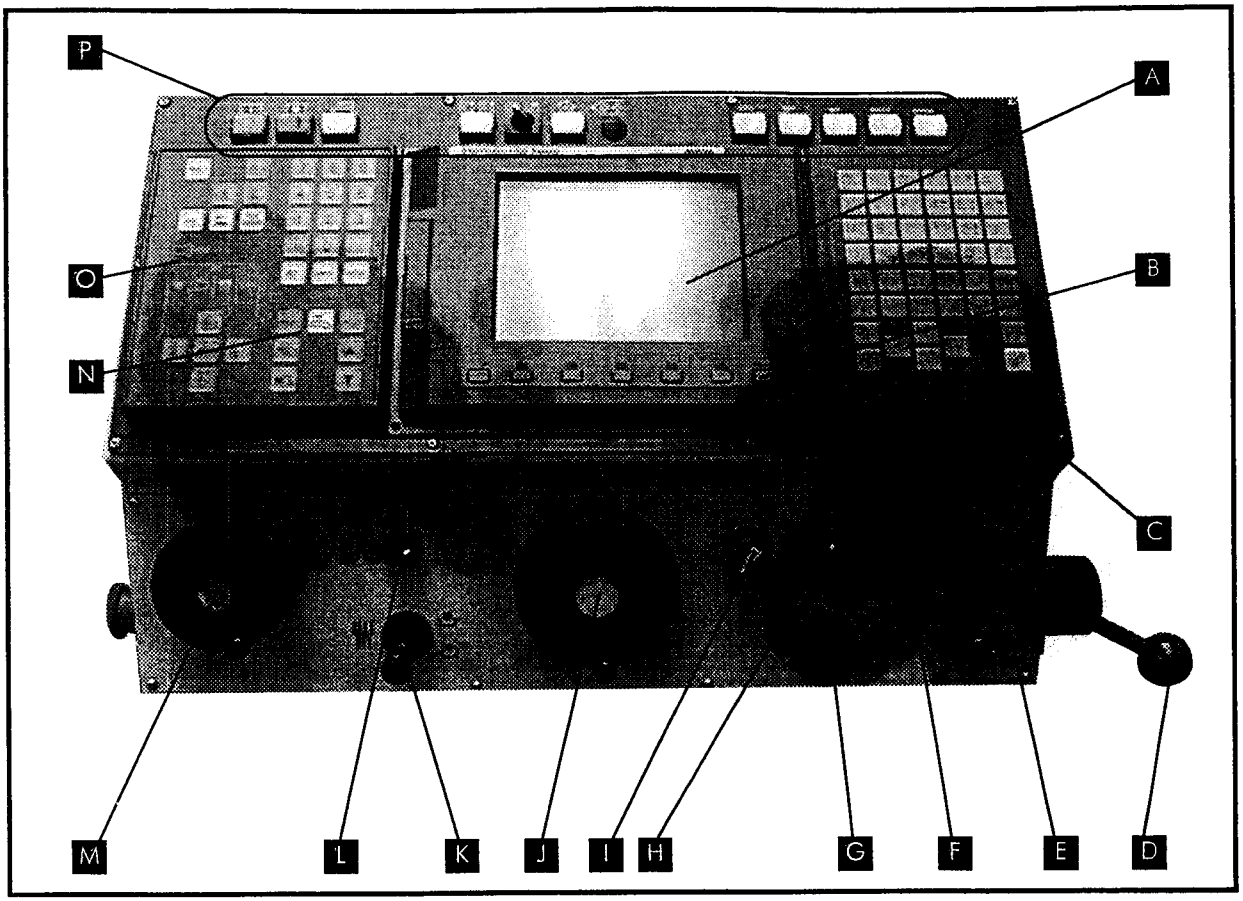
IT IS ESSENTIAL THAT THE OPERATOR HAS APPROPRIATE SKILL AND EXPERIENCE IN THE USE OF A CONVENTIONAL CENTRE LATHE, AND IS FAMILIAR WITH THE MACHINE OPERATORS MANUAL, IN PARTICULAR THE SAFETY NOTES.

OPERATOR CONTROL STATION - ALPHA PLUS 330S



A.	Display Screen	I.	Spindle speed control
B.	Screen Softkeys	J.	'Z' Axis handwheel
C.	CNC Keypad **	K.	Feed engage lever
D.	Spindle Start/Stop lever	L.	Handwheel increment select switch
E.	System ON/OFF buttons	M.	'X' Axis handwheel
F.	Feed override switch	N.	MDI operators keypad
G.	Emergency stop button	O.	Spindle Load indicator
H.	Spindle Forward/Reverse switch	P.	Operator control buttons **

OPERATOR CONTROL STATION - ALPHA PLUS 400S/460S/550S/800S*



DISPLAY SCREEN

Q. Axis Position Readouts

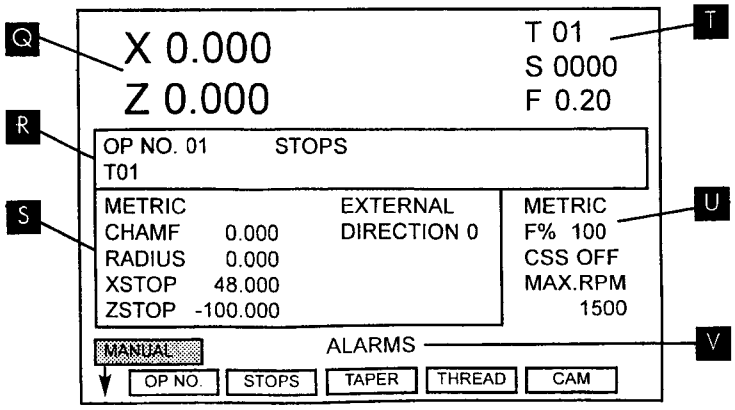
R. Operation Run Block

S. Operation Set-up Table and Prompt Messages

T. Registered Tool Number, Spindle Speed (when running) and Feedrate Status

U. Units, Feed % and CSS Status

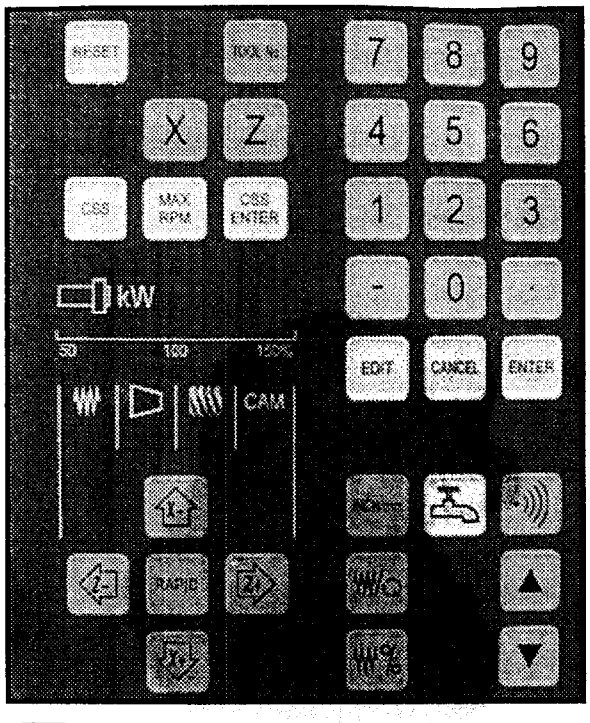
V. Alarms and Operator Guide Messages



* The 800S machines control panel differs slightly from picture shown

** see 'CNC Tutorial' manual

MDI KEYPAD BUTTONS



RESET System Reset

TOOL No. Tool No. Input

X X Axis Reference Input

Z Z Axis Reference Input

CSS CSS Mode Select

MAX RPM CSS Maximum RPM Input

CSS ENTER CSS 'Start Point' Enter

EDIT Edit Screen Access

CANCEL Cancel Data Input

ENTER Data Enter/Select

INCH/mm Units Select

Feed Per/Rev Select

Feed Override Switch

Touch Sensor

Coolant On/Off

Cursor keys used with Feed/Rev, Feed Override and for scrolling through on screen data tables.

Feed Engage Indicator

Taper Mode Indicator

CAM CAM Mode Indicator

Thread Mode Indicator

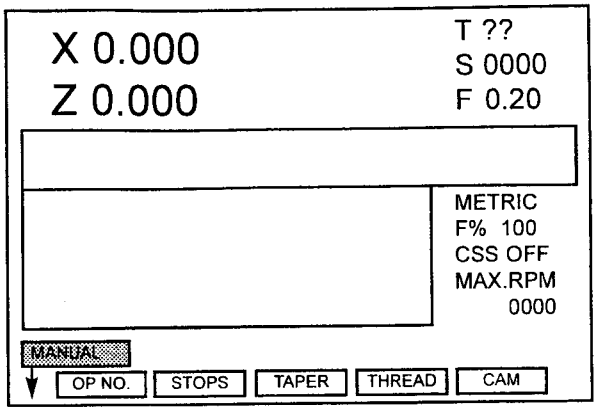
Feed Direction selection keys and Rapid Traverse Engage button

Data Input Keypad

POWER ON

Switch on mains isolator (this is situated behind the lathe at the headstock end), the red system off pushbutton (at the operators control panel) will illuminate, confirm emergency stop button(s) are un-latched (twist to release).

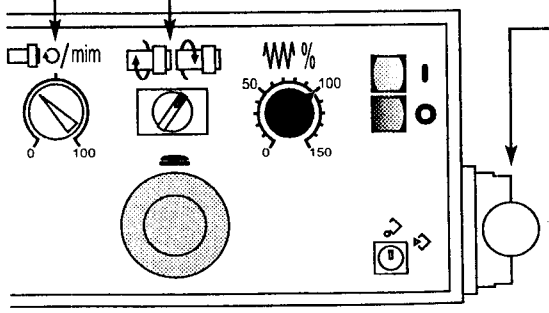
Press green 'SYSTEM ON' pushbutton and wait for screen display to appear.



Machine is now ready for use in manual operation mode.

TO RUN SPINDLE IN FORWARDS DIRECTION AT 1000 RPM

Select high spindle speed range using the relevant method for your machine.
I.E. At the headstock 'Range Select Lever' on Alpha Plus 400S/460S/550S, Changing the belt over on Alpha Plus 330S or with the 'Speed Range Select Button' on Alpha Plus 800S (See Section 2 'Operation' - in the main machine manual for more details).



Select forward spindle direction at the control panel switch.

Turn speed control knob to minimum.

Lift spindle START/STOP lever to run spindle at minimum RPM and wait approx. 2 seconds for screen message to clear.

Then turn speed control Knob up to give 1000RPM. (speed will be displayed on screen).

To stop spindle move the START/STOP lever down again.

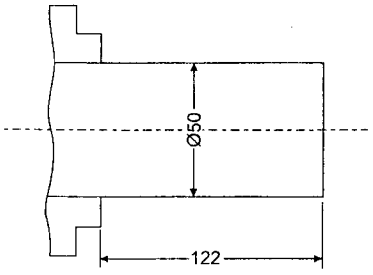
For subsequent spindle starts use START/STOP lever only - spindle will start at the RPM previously set by the speed control knob.

FEED MOVEMENTS: Feed rates are mm (or inches) per rev. and are inhibited when spindle is stationary.

Stopping the spindle during a feed movement will disengage the feed.

WORKPIECE BLANK REQUIRED.

Free Cutting Low Carbon Steel.

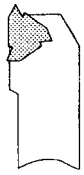


TOOLS REQUIRED:

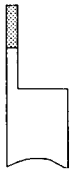
All Tools Must Be Referenced.

TOOL NO.1
55° External
Turning.

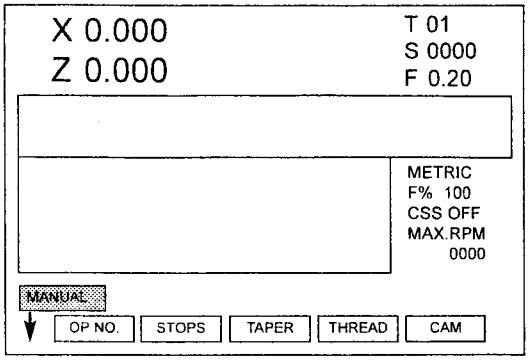
TOOL NO.2
60° V-Profile
1-2mm Pitch



TOOL NO.3
4mm Wide Parting
Off Tool.



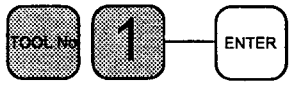
SCREEN DATA AT MACHINE POWER UP



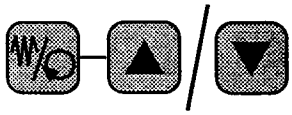
TO REFERENCE TOOL NO. 1

Use cut and measure method as follows:
First register tool to be referenced

Mount tool no.1 on toolpost & register tool no.1 on screen. *(using the keypad buttons)*

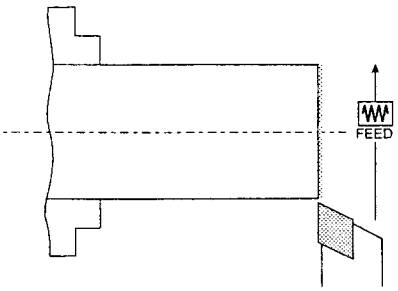


Set Feed Rate 'F' on screen at 0.2mm/rev. *(using the keypad buttons)*



Run Spindle in forward direction at say 1000 rpm

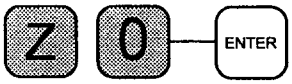
TO REFERENCE TOOL NO. 1 'FOR LENGTH'



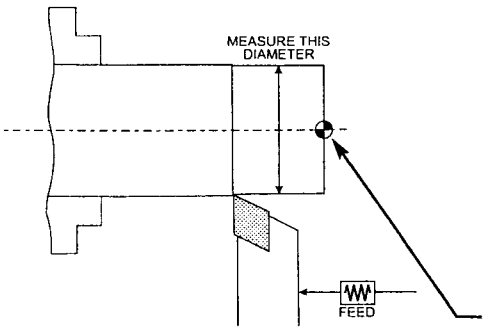
Position tool as shown & select feed direction *(using the keypad buttons)*

Engage feed and skim end of bar. DO NOT move tool in 'Z' axis after cut.

Enter 'Z'=0 Reference Point



TO REFERENCE TOOL NO. 1 'FOR DIAMETER'

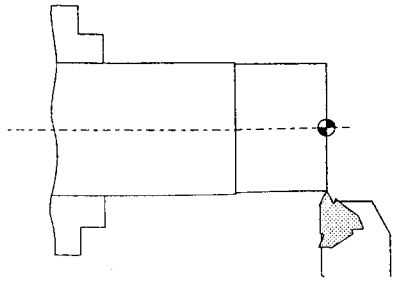


Position tool as shown & select feed direction *(using the keypad buttons)*

Engage feed and skim diameter. DO NOT move tool in 'X' axis after cut

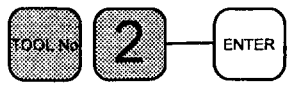
Measure skimmed diameter and enter result as 'X' axis reference diameter. *(using the keypad buttons)* e.g.

TOOL NO.1 is now referenced 'X'=0 : 'Z'=0 to this point



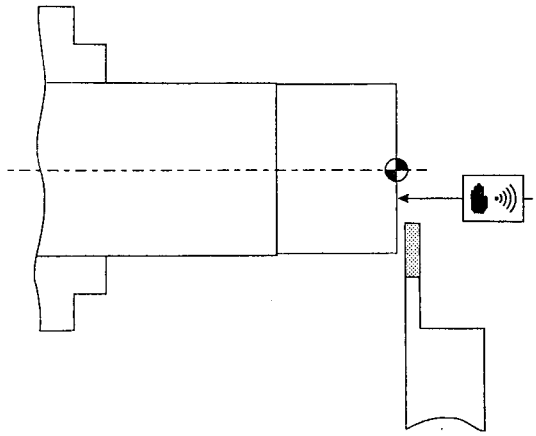
TO REFERENCE TOOL NO. 2

Mount tool no.2 on toolpost & register tool no.2 on screen. *(using the keypad buttons)*



Then proceed generally as above, but align centre of 'V' - form on tool, with end of workpiece when setting 'Z'=0 point.

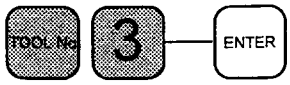
WORKPIECE SO FAR....



TO REFERENCE TOOL NO. 3

Use 'Touch on sensor' facility as follows:

Mount tool no.3 on toolpost & register tool no.3 on screen.
(using the keypad buttons)



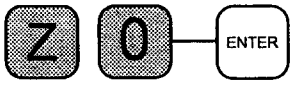
Note 'Touch On' procedure is only carried out with the spindle stationary

TO REFERENCE TOOL NO. 3 'FOR LENGTH'

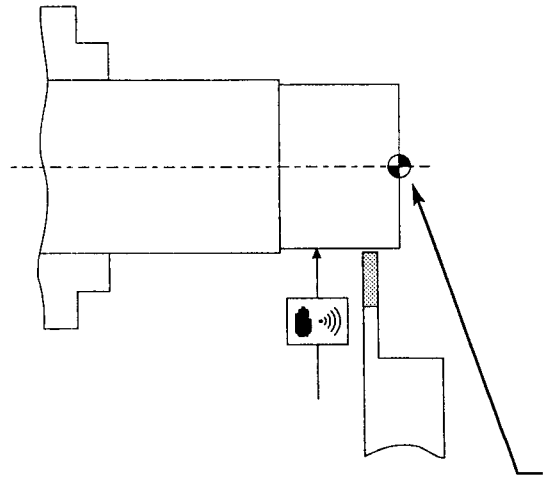
Position tool as shown & select 'Sensor Mode'
(using the keypad button)

Manually feed tool in direction shown until contact is made with the workpiece when a 'bleeper' will sound.

Enter 'Z'=0 Reference Point



Move tool off workpiece & cancel 'Sensor mode'
(using the keypad button)



TO REFERENCE TOOL NO. 3 'FOR DIAMETER'

Position tool as shown & select 'Sensor Mode'
(using the keypad button)

Manually feed tool in direction shown until contact is made with the workpiece when a 'bleeper' will sound.

Enter known diameter as 'X' axis reference diameter.
(using the keypad button) e.g.

Move tool off workpiece & cancel 'Sensor mode'
(using the keypad button)

TOOL NO.3 is now referenced 'X'=0 : 'Z'=0 to this point

GENERAL NOTES:

'Cut and Measure' or **'Touch Sensor'** routines may be introduced at any time during a machining cycle.

e.g. **'Cut and Measure'** can be used for fine adjustment of tool reference data, say to achieve component size under particular cutting conditions:

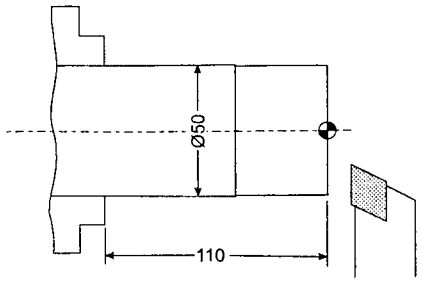
Take 'Sizing' cut, DO NOT move tool in axis concerned, Measure component and enter measured value to replace readout value:

e.g. **'Touch Sensor'** can be used to position a tool prior to making a cut,say in a bore where sight of the tool is restricted or to reference or re-reference a tool to a prior machined component.

Always ensure that the actual tool at the workpiece corresponds to the tool number registered on the screen.

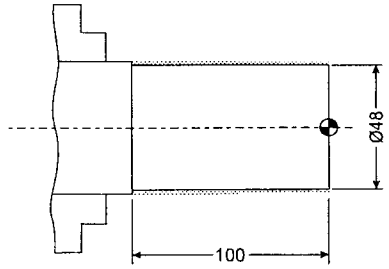
OPERATION NUMBER 1

WORKPIECE SO FAR....



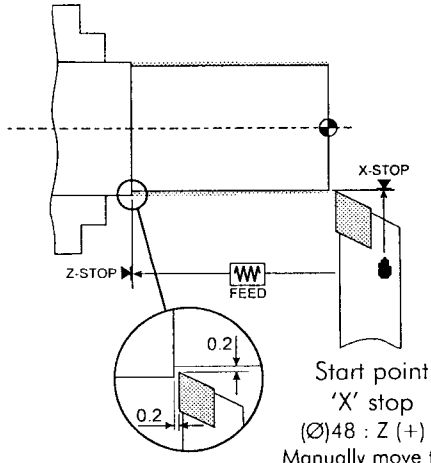
OPERATION: NO.1

Turn O/dia: Ø48 x 100mm long.
Spindle Speed: 1000 rpm.
Feed Rate: 0.2mm/rev.



CUTTING METAL:

Run Spindle at 1000 rpm.



Traverse finish point (with auto pull-off) at 'Z' stop point.

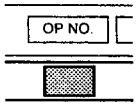
Start point 'X' stop (Ø)48 : Z (+) 3 Manually move tool onto 'X' Stop and Engage feed in direction shown

COMMENTS:

'X' values are diameters.
'X-STOP' approach direction is determined by EXTERNAL or INTERNAL cut selection
'Z-STOP' is effective when approached from either side, thus tool must be positioned to approach Z-STOP from appropriate side before the stop is set.

Cancel any existing feed selection.
(by pressing any illuminated feed select keypad button)

Select operation [OP NO.] *at screen pushbutton*

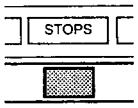


An operation Run Block will appear on screen

OP NO. 01	STOPS	X 00.000
T??	EXT	Z 00.000

If necessary scroll through any other existing operations to OP NO.1 *(Using the keypad buttons)*

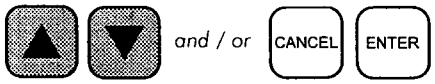
Select Stops [STOPS] *at screen pushbutton*



Stops set-up data will appear on the screen

OP NO. 01 STOPS			
T??			
METRIC		EXTERNAL	METRIC
CHAMF	0.000	DIRECTION 0	F% 100
RADIUS	0.000		CSS OFF
XSTOP	00.000		MAX.RPM
ZSTOP	00.000		0000

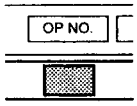
Scroll through the set-up table, *(Using the keypad buttons)*



To select options *and/or* Enter values shown below

OP NO. 01 STOPS			
T01			
METRIC		EXTERNAL	METRIC
CHAMF	0.000	DIRECTION 0	F% 100
RADIUS	0.000		CSS OFF
XSTOP	48.000		MAX.RPM
ZSTOP	-100.000		0000

Use [OP NO.] button to register set-up data



Then revised run block will appear on screen

OP NO. 01	STOPS	X 48.000
T01	EXT	Z -100.000

Displayed run block will be 'active' when feed direction is selected

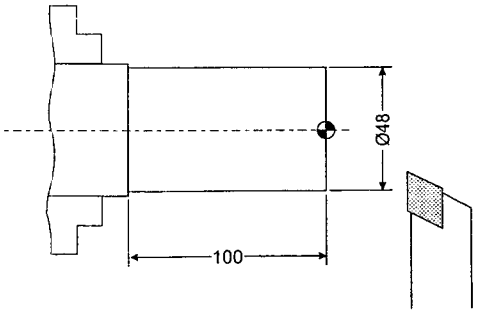
Block active will be indicated by 'highlighted' 'OP NO.' in block itself

OP NO. 01	STOPS	X 48.000
T01	EXT	Z -100.000

OPERATION NUMBER 2

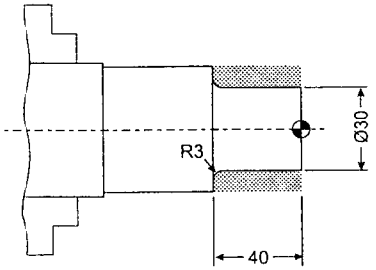
WORKPIECE SO FAR....

Use Tool No. 1



OPERATION: NO.2

Turn : Ø30 x 40mm long shoulder with R3.
Fillet & Skim Shoulder
Spindle Speed: 1000 rpm.
Feed Rate: 0.2mm/rev.



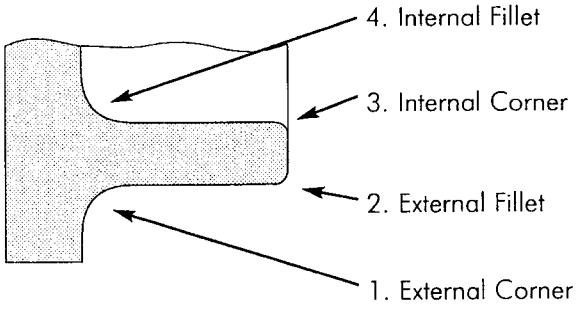
On Screen Set-Up Data :

OP NO. 02	STOPS		
T01			
METRIC		EXTERNAL	METRIC
CHAMF	0.000	DIRECTION 1	F% 100
RADIUS	3.000		CSS OFF
XSTOP	30.000		MAX.RPM
ZSTOP	-40.000		0000

On Screen Run Block :

OP NO. 02	STOPS	X 30.000	RADIUS 1
T01	EXT	Z -40.000	R 3.000

Radius or Chamfer Directions :

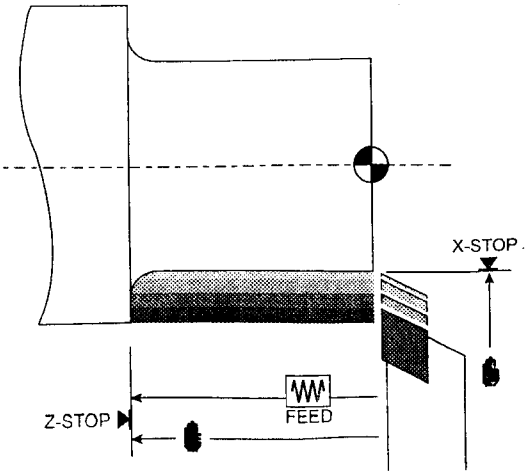


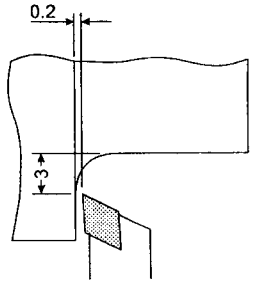
CUTTING METAL :

Run Spindle at 1000 rpm.

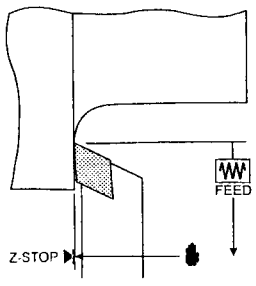
Start Points:

Pass No. 1	X (Ø) 42 : Z(+) 3	3mm Roughing Cut
Pass No. 2	X (Ø) 36 : Z(+) 3	3mm Roughing Cut
Pass No. 3	X (Ø) 31 : Z(+) 3	2.5mm Roughing Cut
Pass No. 4	X-STOP (Ø) 30 : Z(+) 3	0.5mm Finishing Cut





Finish Point - Pass No. 4 (with auto pull-off) at end of fillet radius.

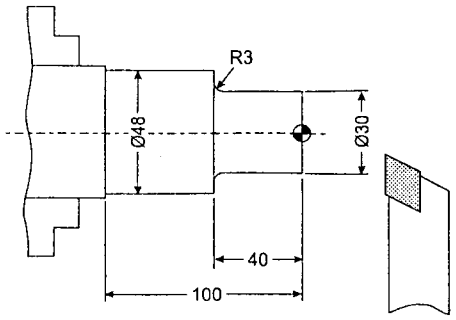


Manually move tool onto 'Z' stop and feed out to skim shoulder.

OPERATION NUMBER 3

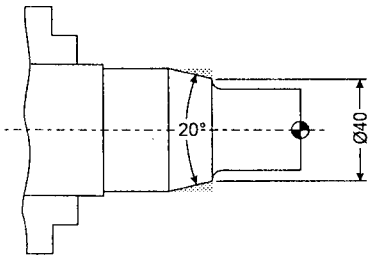
WORKPIECE SO FAR....

Use Tool No. 1



OPERATION: NO.3

Turn : 20° Inc. Taper
Spindle Speed: 1000 rpm.
Feed Rate: 0.2mm/rev.



On Screen Set-Up Data :

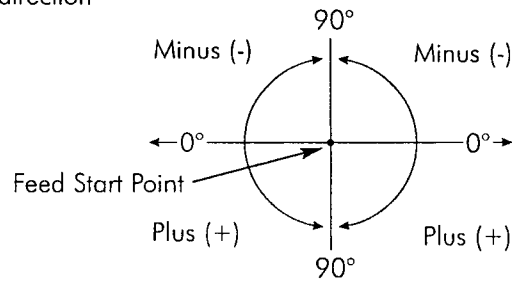
OP NO. 03	TAPER			
T01				
METRIC				METRIC
ANGLE	10.000	XPOS	40.000	F% 100
XSTOP	40.000	ZPOS	-40.000	CSS OFF
ZSTOP	-80.000	XPOS	48.000	MAX.RPM
EXT		ZPOS	-62.985	0000

On Screen Run Block :

OP NO. 03	TAPER	X 40.000	
T01	EXT		DEG 10.000

'Angle to Z axis' value is required in set-up table. This angle can be generated automatically by entering X1:Z1 & X2:Z2 values only. Where 'X' values are entered as diameters. 'X' axis feeds are inhibited for taper operation.

Angle sign convention select appropriate 'Z' feed direction

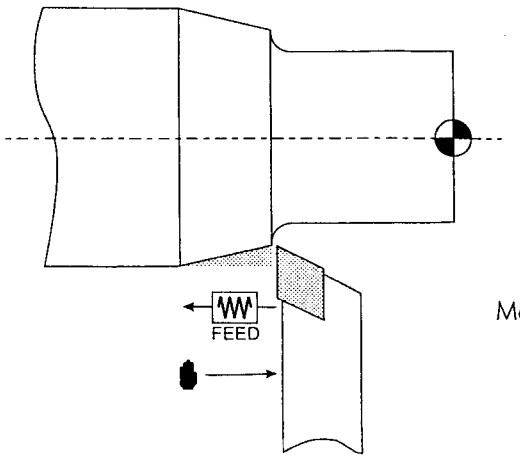


CUTTING METAL :

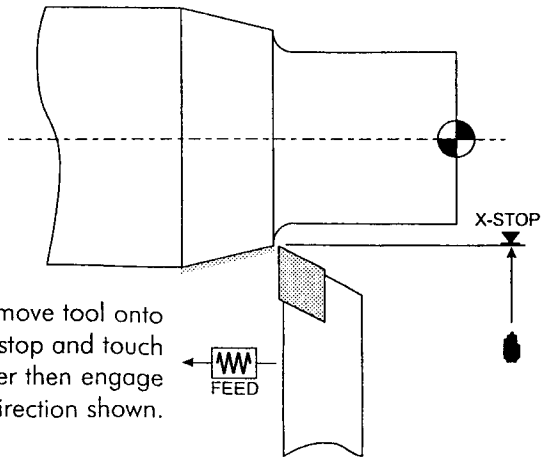
Run Spindle at 1000 rpm.

Start Point:

Pass No. 1 X (Ø) 41 : Z(-) 37
3.5mm Roughing Cut



Pass No. 2 X-STOP (Ø) 40 : Z(-) 40
0.5mm Finishing Cut

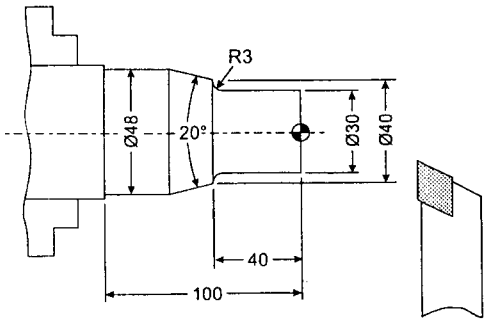


Manually move tool onto 'X' stop and touch Shoulder then engage feed direction shown.

OPERATION NUMBER 4

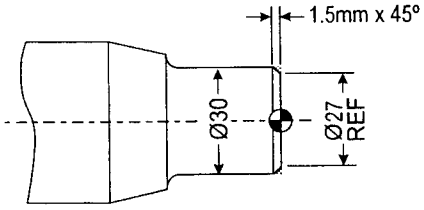
WORKPIECE SO FAR....

Use Tool No. 1



OPERATION: NO.4

Chamfer : 1.5mm x 45°
Spindle Speed: 1000 rpm.
Feed Rate: 0.2mm/rev.



On Screen Set-Up Data :

OP NO. 04 STOPS T01			
METRIC CHAMF RADIUS XSTOP ZSTOP	 1.500 0.000 27.000 -1.500	EXTERNAL DIRECTION 2	METRIC F% 100 CSS OFF MAX.RPM 0000

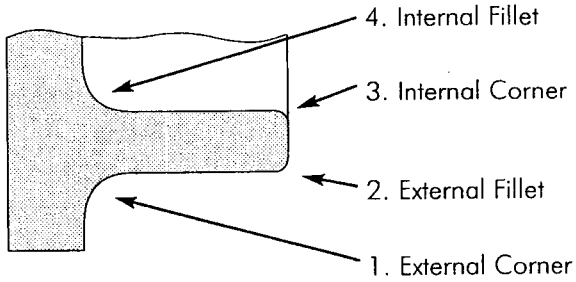
On Screen Run Block :

OP NO. 04	STOPS	X 27.000	CHAMFER 2
T01	EXT	Z -1.500	C 1.500

Use 'Z' axis feed to produce Chamfers (or Radii), Both 'X' & 'Z' stop settings are required.

Tool movements by Handwheels are restricted only to Stops and not to line of chamfer.

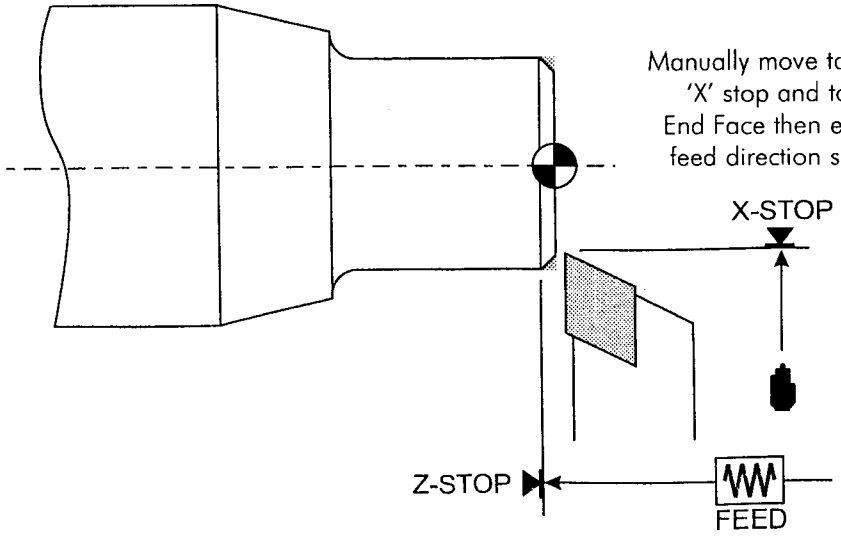
Radius or Chamfer Directions :



CUTTING METAL :

Run Spindle at 1000 rpm.

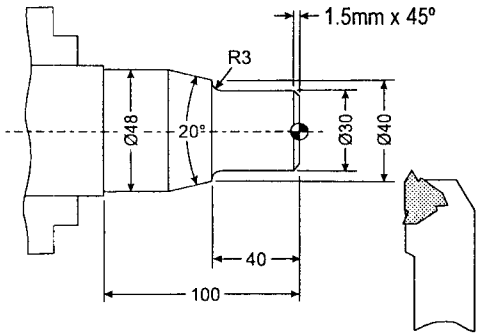
Start Point: X-STOP (Ø) 28 : Z=0



OPERATION NUMBER 5

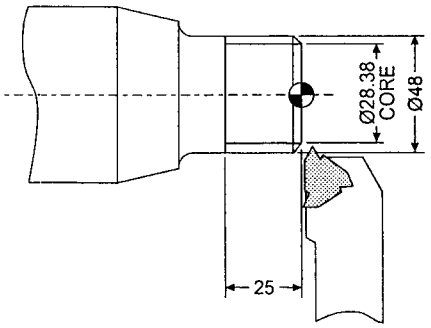
WORKPIECE SO FAR....

Use Tool No. 2



OPERATION: NO.5

Cut Metric Thread : Ø30 x 1.5mm Pitch ISO
Spindle Speed: 200 rpm.



On Screen Set-Up Data :

OP NO. 05	THREAD			
T02 AUTO			FLANK ANGLE	0.000
METRIC		LENGTH	25.000	METRIC
PITCH	1.500	ZSTOP	-25.000	F% 100
DIAM	30.000	ANGLE	0.000	CSS OFF
XSTOP	28.380	NO.STARTS	1	MAX.RPM
NO.PASSES	10.2	EXTERNAL		0000

On Screen Run Block :

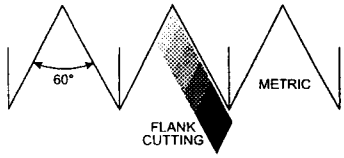
OP NO. 05	THREAD	D	30.000	P1.500		X 28.380
T02	EXT	1S	ZS 4.500	DEG	0.000	Z-25.000

Undercut not required, Tool will pull out automatically.
'Angle' is 'Angle to axis' when thread is tapered
'Z Start' (Start point) will be calculated by control to give approximately 3x pitch as a "Pick Up Length" 'X' start point is nominal thread o.d. (shown as DIAM on screen)

Set 'XSTOP' to thread core diameter (This machine will run fully automatic over any length)

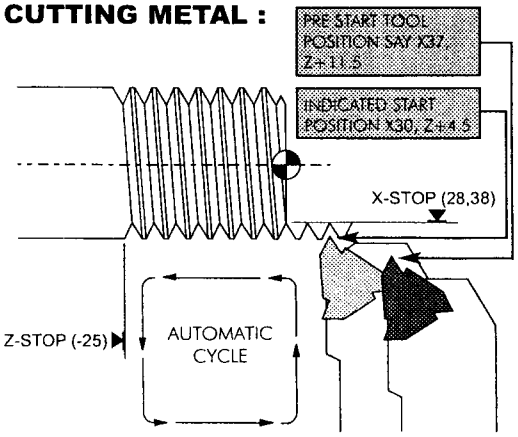
For additional **'Spring Out Passes'** Enter a figure following the number of passes after the decimal point. e.g. 10.2 (two spring passes)

Note: Flank Angle is dependant on the form of thread e.g. 60° for metric and 55° for imperial.
If the figure is left at 0° then the tool will plunge cut the thread.



Note: If the number of passes is 1 (one) or change to 1 (one) the Flank Angle must be 0 (zero)

CUTTING METAL :



Manually position tool more than 5mm outside indicated start point. Say X37, z+11.5 in this case.

Run spindle at 200 rpm.

Press  to select feed direction.

(This action will lock the spindle speed at 200 rpm and assign this speed to the threading cycle)

Then turn the Spindle Speed knob to it's minimum value setting

Select Z feed direction  (in this example)

This will activate block and thread mode indicator lamp which will illuminate.

Manually move tool towards indicated start point until both handwheels disengage (This will be as the tool approaches within 5mm on diam. in X and within 5mm in Z of the indicated start point)

Use Feed engage lever to start cycle.

Thread Chasing can be carried out in two ways:-

1. **By altering the thread length** - e.g. if tool appears to be 0.5mm out of pitch then alter thread length by +0.5mm.
2. **By pressing the up/down cursor keys** - Each time the cursor key is pressed it allows the spindle to rotate 2.8° before thread is picked up.

Cancel threading mode as follows:- **1.** Stop Spindle with lever. **2.** Ensure Speed control knob is at minimum

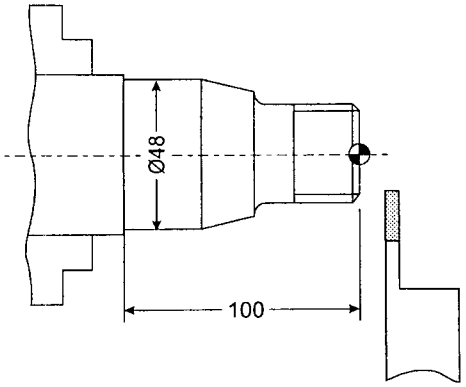
Threads are fully automatic on this machine

Always set Spindle RPM (CSS OFF) to give a thread pass traverse rate less than 3m/min.

OPERATION NUMBER 6

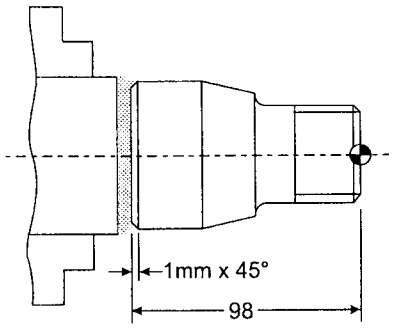
WORKPIECE SO FAR....

Use Tool No. 3



OPERATION: NO.6

Chamfer Corner : 1mm x 45°
Part Off : 98mm Long
Spindle Speed: 1000 rpm.
Feed Rate: 0.2mm/rev.



On Screen Set-Up Data :

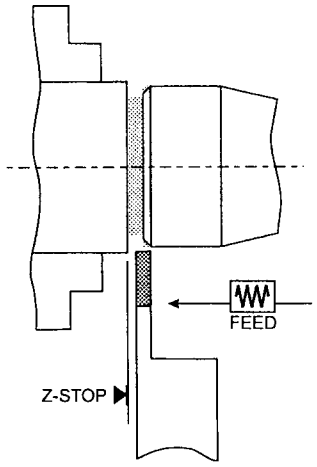
OP NO. 06	TAPER			
T01				
METRIC				METRIC
ANGLE	-45.000	XPOS	0.000	F% 100
XSTOP		ZPOS	0.000	CSS OFF
ZSTOP	-102.000	XPOS	0.000	MAX.RPM
EXT		ZPOS	0.000	0000

On Screen Run Block :

OP NO. 06	TAPER		
T01	EXT	Z -102.500	DEG -45.000

Feed Value is for 'Z' movements, 'X' axis value is always half this figure, (0.2mm/rev in this case).

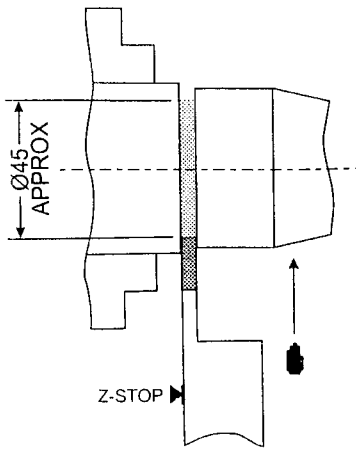
2. Manually position tool at start point for chamfer : X=48, Z=-101 and engage 'Z' feed to cut chamfer



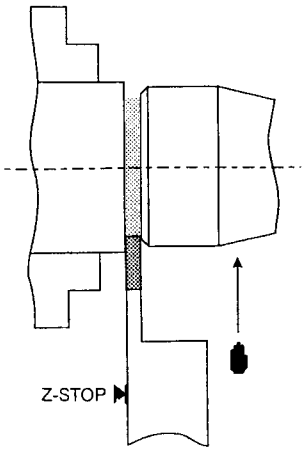
CUTTING METAL :

Run Spindle at 1000 rpm.

1. Plunge in at Z-STOP to form groove

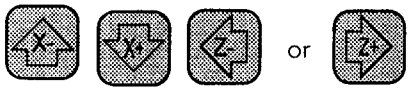


3. Continue part off at Z-STOP position under manual feed



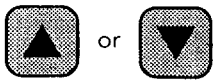
TO MAKE ADDITIONAL IDENTICAL WORKPIECES

1. De-activate the last run block

   Press  or

   (To cancel any illuminated feed select keypad button)

2. Scroll through the operation run blocks, back to OP NO. 1

   (using the scroll keypad buttons)  or

OP NO. 01	STOPS	X 48.000
T01	EXT	Z -100.000

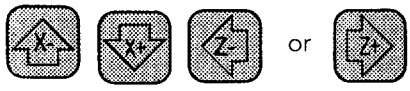
3. Re-activate OP NO. 1 by selecting

    Feed direction

OP NO. 01	STOPS	X 48.000
T01	EXT	Z -100.000

4. Continue to work through operations 1 - 6 as before but without the need to re-input the set-up data.

   i.e. Simply de-activate each operation as it is completed

   Press  or

   (To cancel any illuminated feed select keypad button)

   And increment the operation number

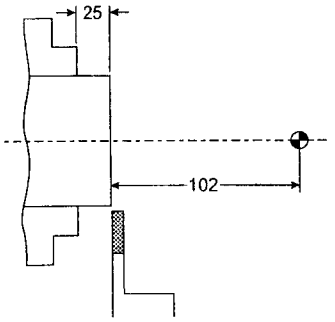
   (By pressing the 'Scroll Down' keypad button) 

   At the end of each operation

CONSTANT SURFACE SPEED CUTTING

Note: To prevent unintentionally high (Thus unsafe) spindle speeds, C.S.S. cutting must always be preceded by a physical 'Run and Speed capping' process for the particular workpiece/work-holding and tool combination under consideration.

WORKPIECE SO FAR....
Use Tool No. 3

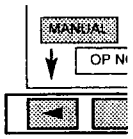


FINAL OPERATION

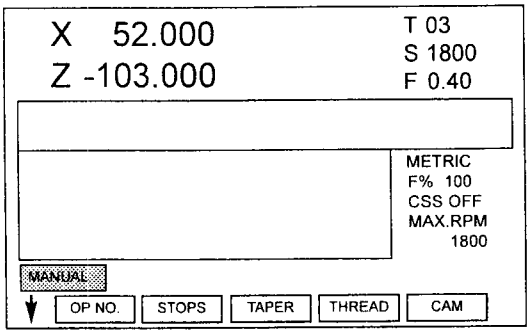
Face off material stub under constant surface speed cutting.

Retract tool after operation no. 6 to approximate position shown above.

Select manual mode operation



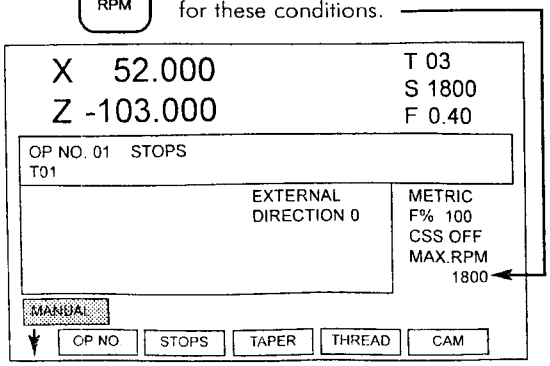
Position tool to start cut X=52, Z=-103



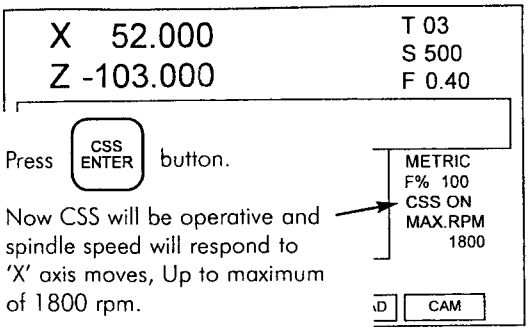
SPEED CAPPING

Turn the speed control knob (at the operator control panel) to the minimum setting. Start the spindle (at minimum rpm.) then increase the speed (using the speed control knob) up to an acceptable maximum for this particular workpiece/work-holding and tool combination, 1800 rpm. in this case.

Press [MAX RPM] to set this speed as a maximum for these conditions.



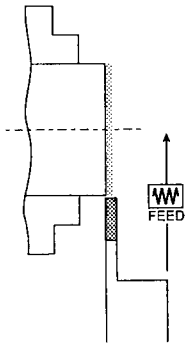
Adjust spindle speed (using speed control knob) for correct cutting speed at start of cut. i.e. 500 rpm. in this case.



Press [CSS ENTER] button.

Now CSS will be operative and spindle speed will respond to 'X' axis moves, Up to maximum of 1800 rpm.

Engage feed and skim face to centre of bar, Spindle speed will increase to maintain a constant surface cutting speed (up to maximum 1800rpm.)

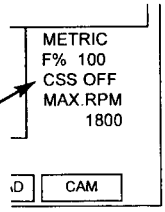


CANCEL CSS MODE AS FOLLOWS:

With the spindle still running turn spindle speed control knob to a minimum and

Press [CSS] button

To switch CSS mode off



Notes: Maximum spindle speed relates to workpiece set up and tool combination not cutting tool only.

Use [CSS] button

To switch CSS mode ON or OFF (as above) If no CSS data is registered for active tool number spindle speed will default to minimum.

CSS data will be cancelled when spindle speed range is changed or machine is powered down.

If spindle is running when CSS mode is switched on, speed will change to the appropriate CSS rpm. for 'X' axis tool position.

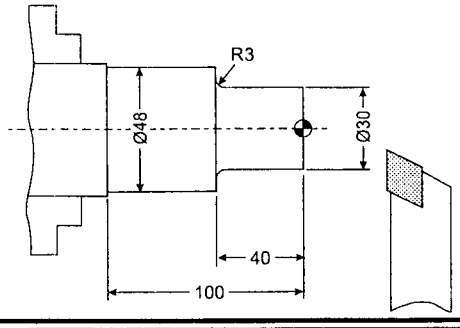
If spindle is stationary when CSS mode is selected then at start up, speed will be the appropriate CSS rpm. for the active tool & 'X' axis tool position.

ADDITIONAL WORK - CUTTING EXTERNAL RADII - WORKPIECE No.2

Workblank required as previous tutorial work up to operation no.2

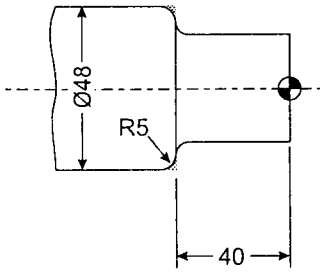
WORKPIECE SO FAR....

Use Tool No. 1



OPERATION: NO.3 (WORKPIECE NO.2)

Turn: 5mm external radius at Ø48
Spindle Speed: 1000 rpm.
Feed Rate: 0.2mm/rev.



On Screen Set-Up Data :

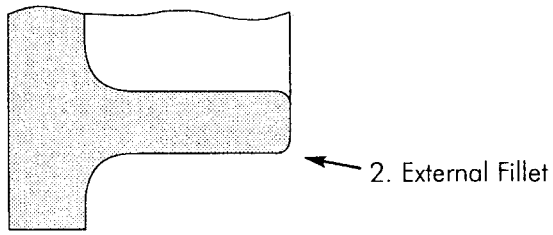
(overwrite op no. 3 from previous component)

OP NO. 03 STOPS T01			
METRIC CHAMF RADIUS XSTOP ZSTOP	 0.000 5.000 38.000 -45.000	EXTERNAL DIRECTION 2	METRIC F% 100 CSS OFF MAX.RPM 0000

On Screen Run Block :

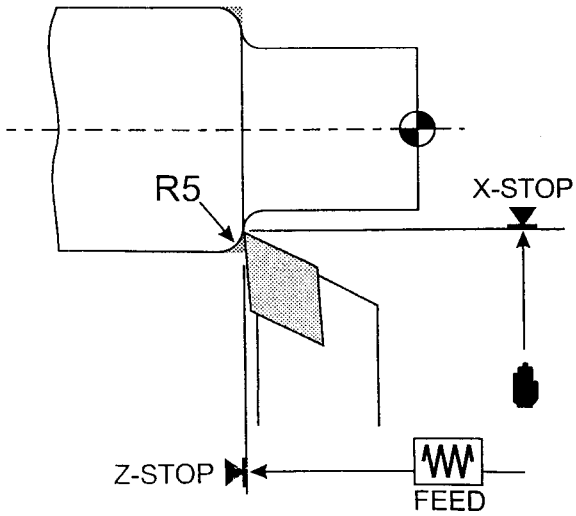
OP NO. 03	STOPS	X 38.000	RADIUS 2
T01	EXT	Z -45.000	R 5.000

Radius Direction :



CUTTING METAL :

Run Spindle at 1000 rpm.



Start Point: X-STOP (Ø) 38 : Z(-)37

Manually move tool onto 'X' stop and to just ouch shoulder in 'Z'

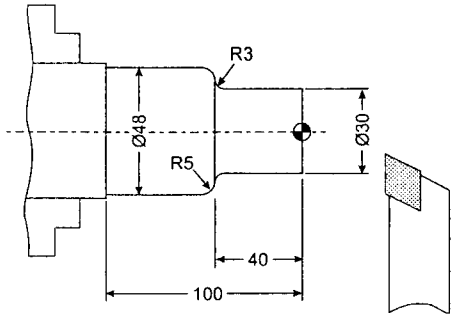
Then select  feed direction

And engage feed using 'Feed Engage' lever

ADDITIONAL WORK - CUTTING EXTERNAL RADII - WORKPIECE No.2

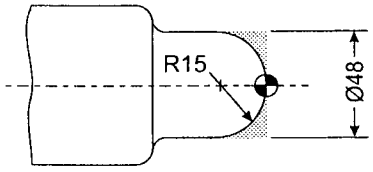
WORKPIECE SO FAR....

Use Tool No. 1



OPERATION: NO.4 (WORKPIECE NO.2)

Turn: Ø30 Half ball end
Spindle Speed: 1500 rpm.
Feed Rate: 0.2mm/rev.



On Screen Set-Up Data :

(overwrite op no. 4 from previous component)

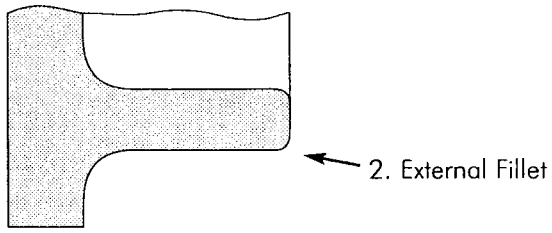
OP NO. 04 STOPS T01			
METRIC		EXTERNAL	METRIC
CHAMF	0.000	DIRECTION 2	F% 100
RADIUS	-15.800		CSS OFF
XSTOP	-0.800		MAX.RPM
ZSTOP	-15.800		0000

Note: 0.8mm Tool nose radius allowance is included in the above set up figures.

On Screen Run Block :

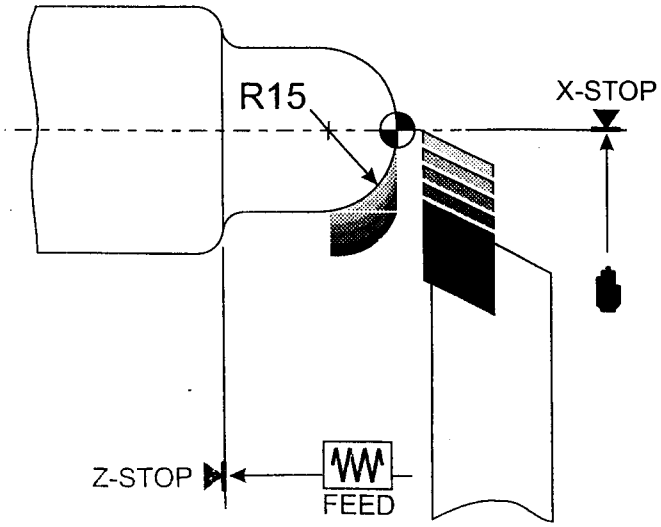
OP NO. 04	STOPS	X 0.000	RADIUS 2
T01	EXT	Z -15.000	R 15.000

Radius Direction :



CUTTING METAL :

Run Spindle at 1500 rpm.



Start Points:

X(Ø) 20 : Z(+) 3
X(Ø) 12 : Z(+) 3
X(Ø) 6 : Z(+) 3
X(Ø) 2 : Z(+) 3
X-STOP (Ø) -0.8 : Z(+) 37

Note:
Tool will always travel one full quadrant from start point.
To save time feed may be disengaged when tool clears the workpiece.

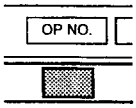
'X' axis feed not applicable for radii operations.

EDIT FUNCTIONS

TO DELETE OPERATIONS

Note:
When operations are deleted by the following method, automatic re-numbering will take place and new operations can not be inserted between the re-numbered ones. (An alternative might be to overwrite some existing operations.)

First select operations at the screen push button (Edit is only available in operation mode)



Select Edit Function [EDIT] At key pad push button

OP NO. 06	TAPER		
T01	EXT	Z -102.500	DEG -45.000

Select Delete Operation

[1] and [ENTER] at keypad →

EDIT

1. DELETE OPERATIONS
2. SAVE OPERATIONS
3. LOAD OPERATIONS

PRESS RESET TO EXIT

Set Block to be Deleted

Scroll [▲] [▼]

OP NO. 06	TAPER		
T01	EXT	Z -102.500	DEG -45.000

Or use Keypad No. Button

Use [3] in this example →

DELETE OPERATIONS

DELETE OPERATION NO. [3]

TO DELETE ALL ENTER 00

PRESS RESET TO EXIT

To call up operation to be deleted

Alternatively

Use keypad number button

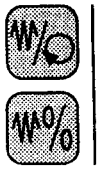
[0] [0]

Message here will monitor delete action as 'In Progress' or 'Complete'

to select 'Delete All', Then Press [ENTER] to activate Delete function

And press [RESET] to exit edit function

EDIT LOCK/UNLOCK



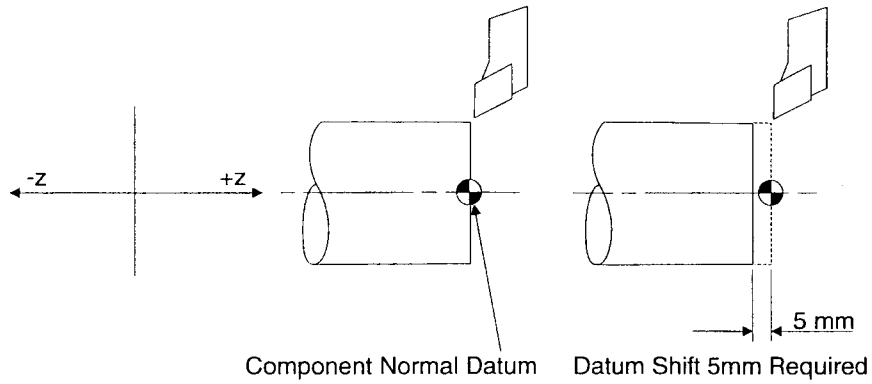
Pressing these two keypad buttons together will prevent changes to existing operation set up data blocks and lock out the edit page delete functions.

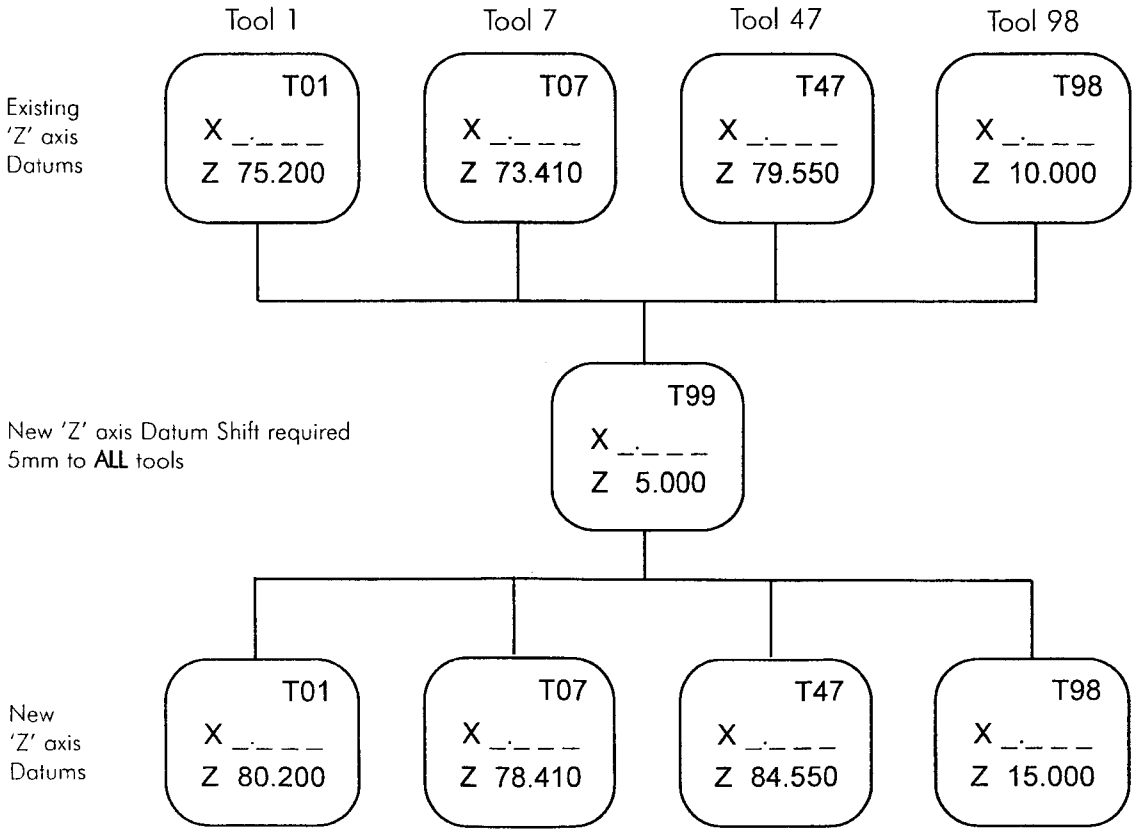
Press same buttons again to remove lock.

COMPONENT 'Z' AXIS DATUM SHIFT

The 'Z' axis tool offset of tool 99 is used as a component datum shift, by simply adding or subtracting the 'Z' axis tool offset value to "ALL" other tools (T.01 to T.98) 'Z' axis tool offsets.

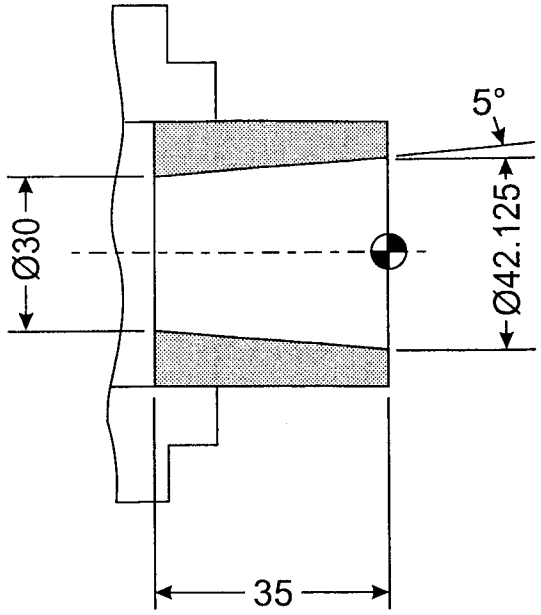
Example : 5mm 'Z' axis datum shift required.





Note: Datum shift will only work on the Z Axis

ADDITIONAL WORK IN TAPER



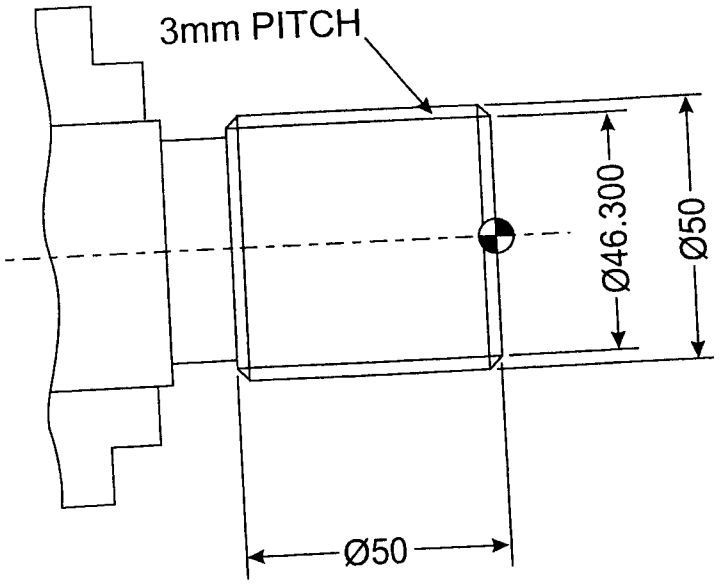
On Screen Set-Up Data :

OP NO. 07	TAPER			
T06				
METRIC				METRIC
ANGLE	5.000	XPOS1	0.000	F% 100
XSTOP	41.125	ZPOS1	0.000	CSS OFF
ZSTOP	-40.000	XPOS1	0.000	MAX.RPM
INT		ZPOS1	0.000	0000

On Screen Run Block :

OP NO. 07	TAPER	X 41.125	
T06	INT	Z -40.000	DEG -5.000

ADDITIONAL WORK IN THREADING



On Screen Set-Up Data : Right Hand Thread External

OP NO. 04	THREAD			
T04		FLANK ANGLE 60		
METRIC		LENGTH 55.000		METRIC
PITCH	3.000	ZSTOP -55.000		F% 100
DIAM	50.000	ANGLE 0.000		CSS OFF
XSTOP	46.300	NO.STARTS 1		MAX.RPM
NO.PASSES	13.2	EXT		0000

On Screen Run Block :

OP NO. 04	THREAD	D	50.300	P	3.000
T04 AUTO	EXT	Z	5.000	DEG	0.000

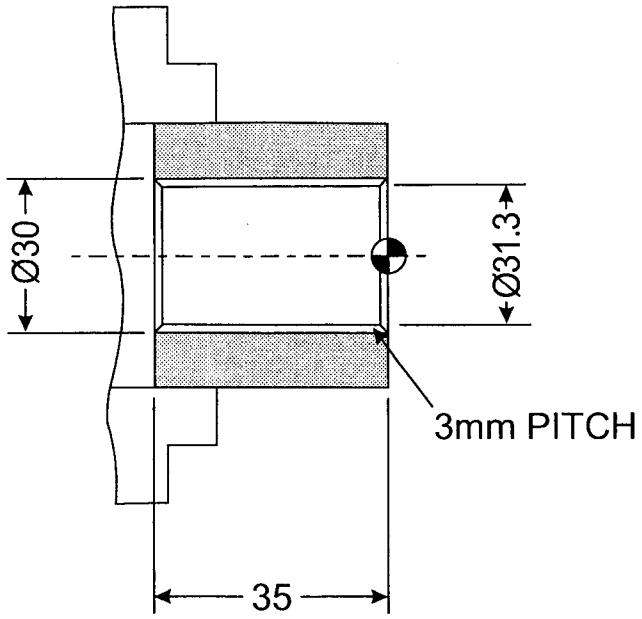
On Screen Set-Up Data : Left Hand Thread External

OP NO. 04	THREAD			
T02		FLANK ANGLE 60		
METRIC		LENGTH -55.000		METRIC
PITCH	3.000	ZSTOP 5.000		F% 100
DIAM	50.000	ANGLE 0.000		CSS OFF
XSTOP	46.300	NO.STARTS 1		MAX.RPM
NO.PASSES	13.2	EXT		0000

On Screen Run Block :

OP NO. 04	THREAD	D	46.300	P	3.000
T02 AUTO	EXT	Z	-55.000	DEG	0.000

ADDITIONAL WORK IN THREADING



On Screen Set-Up Data : Right Hand Thread Internal

OP NO. 04		THREAD			
T04			FLANK ANGLE	60	
METRIC		LENGHT	40.000	METRIC	
PITCH	3.000	ZSTOP	-40.000	F%	100
DIAM	31.300	ANGLE	5.000	CSS	OFF
XSTOP	35.000	NO.STARTS	1	MAX.RPM	
NO.PASSES	13.2	INT			0000

On Screen Run Block :

OP NO. 04	THREAD	D	31.300	P	3.000
T04 AUTO	INT	Z	5.000	DEG	0.000

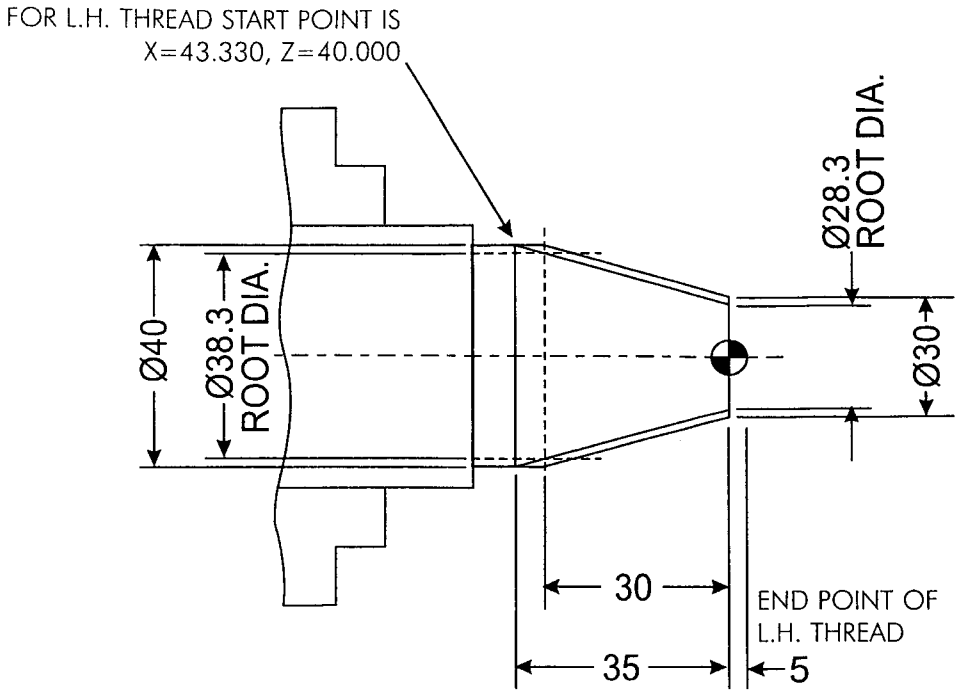
On Screen Set-Up Data : Left Hand Thread Internal

OP NO. 04		THREAD			
T02			FLANK ANGLE	60	
METRIC		LENGHT	-40.000	METRIC	
PITCH	3.000	ZSTOP	5.000	F%	100
DIAM	31.300	ANGLE	0.000	CSS	OFF
XSTOP	35.000	NO.STARTS	1	MAX.RPM	
NO.PASSES	13.2	INT			0000

On Screen Run Block :

OP NO. 04	THREAD	D	31.300	P	3.000
T02 AUTO	INT	Z	-40.000	DEG	0.000

ADDITIONAL WORK IN THREADING



On Screen Set-Up Data : Right Hand Taper Thread External

OP NO. 05		THREAD			
T04			FLANK ANGLE	60	
METRIC		LENGTH	40.000	METRIC	
PITCH	1.500	ZSTOP	-40.000	F%	100
DIAM	30.000	ANGLE	9.462	CSS	OFF
XSTOP	28.300	NO.STARTS	1	MAX.RPM	
NO.PASSES	10.2	EXT			0000

On Screen Run Block :

OP NO. 05	THREAD	D	30.000	P	1.500
T04 AUTO	EXT	Z	4.500	DEG	9.462

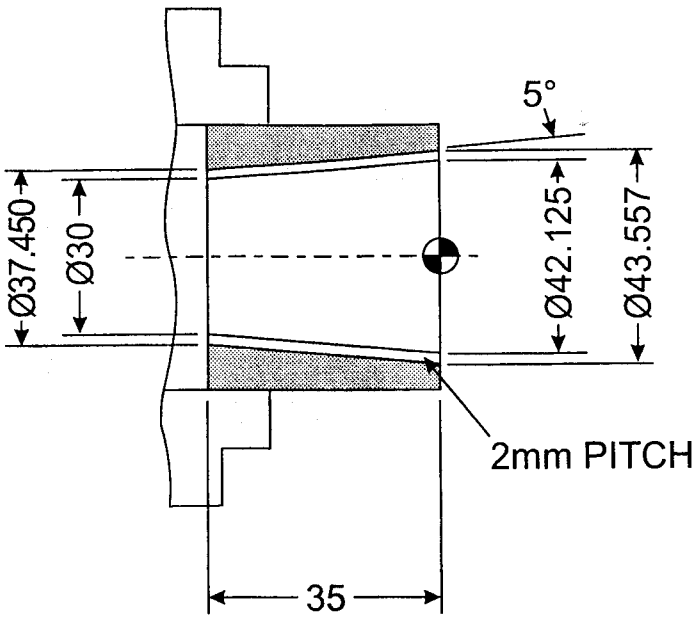
On Screen Set-Up Data : Left Hand Taper Thread External

OP NO. 05		THREAD			
T02			FLANK ANGLE	60	
METRIC		LENGTH	-55.000	METRIC	
PITCH	1.500	ZSTOP	5.000	F%	100
DIAM	50.000	ANGLE	9.462	CSS	OFF
XSTOP	46.300	NO.STARTS	1	MAX.RPM	
NO.PASSES	13.2	EXT			0000

On Screen Run Block :

OP NO. 05	THREAD	D	43.330	P	1.500
T02 AUTO	EXT	Z	-44.500	DEG	9.462

ADDITIONAL WORK IN THREADING



On Screen Set-Up Data : Right Hand Taper Thread Internal

OP NO. 04		THREAD			
T04			FLANK ANGLE	60	
METRIC		LENGTH	40.000	METRIC	
PITCH	2.000	ZSTOP	-40.000	F%	100
DIAM	41.125	ANGLE	-5.000	CSS	OFF
XSTOP	-43.577	NO.STARTS	1	MAX.RPM	
NO.PASSES	13.2	INT			0000

On Screen Run Block :

OP NO. 04	THREAD	D	41.000	P	2.000
T04 AUTO	INT 1S	Z	5.000	DEG	-5.000

On Screen Set-Up Data : Left Hand Taper Thread Internal

OP NO. 04		THREAD			
T02			FLANK ANGLE	60	
METRIC		LENGTH	-40.000	METRIC	
PITCH	2.000	ZSTOP	5.000	F%	100
DIAM	35.000	ANGLE	-5.000	CSS	OFF
XSTOP	37.452	NO.STARTS	1	MAX.RPM	
NO.PASSES	13.2	INT			0000

On Screen Run Block :

OP NO. 04	THREAD	D	35.000	P	2.000
T02 AUTO	INT	Z	-40.000	DEG	-5.000