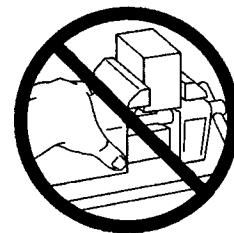
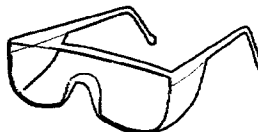


Safety & Operation Instructions For RCT50 Reduced Cycle Time Self-Reversing Tapping Units

WARNING To Avoid Serious Injury And Ensure Best Results For Your Tapping Operation, Please Read Carefully *All* operator and safety instructions provided for this tapping attachment as well as all other safety instructions that are applicable, especially those for your machine tool.

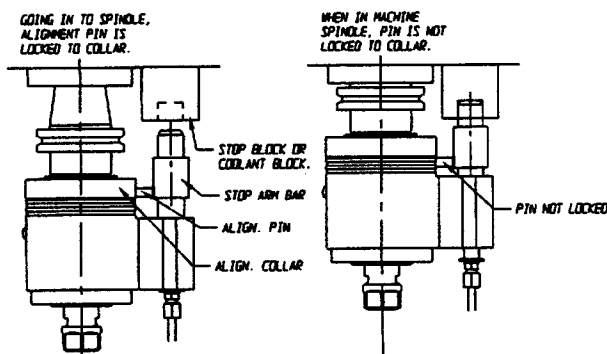
1. Proper Clothing: The rotating spindle of a machine tool can snag loose fitting clothing, jewelry or long hair. Never wear jewelry, long sleeves, neckties, gloves or anything else that could become caught when operating a machine tool. Long hair must be restrained or netted to prevent it from becoming entangled in rotating spindle. Steel toed boots should also be worn in any machine environment.

2. Proper Eye Protection: Always wear safety glasses with side shields to protect your eyes from flying particles.



3. Proper Work Piece Fixturing: Never hold the work piece or the vise it is held in, by hand. The work piece must be clamped firmly to the table of the machine so that it cannot move, rotate or lift.

4. On Machining Centers: The same rule for stop arm and stop block installation applies "Always be sure that the installation is stronger than the largest tap." Automatic tool changes should only be made on enclosed machines.



5. The tapping attachment housing, drive spindle and tap itself can become hot to the touch after operation. Use caution when removing the attachment from the machine or handling.

6. Always Be Aware Of The Potential Hazards Of A Machining Operation: Sometimes working with your machine can seem routine. You may find that you are no longer concentrating on the operation. A feeling of false security can lead to serious injury. Always be alert to the dangers of the machines with which you work. Always keep hands, body parts, clothing, jewelry and hair out of the areas of operation, when the machine spindle is rotating. Areas of operation include the immediate point of machining and all transmission components including the tapping attachment. Never bring your hand, other body parts or anything attached to your body into any of these areas until the machine spindle is completely stopped.

7. Be aware of any other applicable safety instructions / requirements.

Check List For Good Tapping

- 1. Never use this unit before reading all safety instructions for this attachment as well as the machine it is to be used on.
- 2. Is tap sharp and of correct design for current job?
- 3. Is tap in proper alignment with drilled hole?
- 4. Is machine speed correct?
- 5. Is machine feed correct?
- 6. Is machine stop set properly so tap releases in neutral rather than bottoming in work piece or fixture?
- 7. Is drilled hole the correct size?
- 8. Is clearance between the drilled hole and tap sufficient at start position to allow the tap to clear the hole upon retraction?
- 9. Is the stop arm of the tapping attachment held rigidly against rotation. Stop Arm installation must be stronger than largest tap.

References for this Safety Information include but are not limited to:

American National Standards Institute
ANSI B11.8-1983 (Adopted May 31, 1983
by Department of Defense)
Coastal Video Communications Corporation
Machine Guarding Copy Right 1994

Society Of Manufacturing Engineers
Tool and Manufacturing Engineers Handbook
Volume 1 Machining
(Library of Congress Catalog No. 82-060312



PROGRAMMING: RCT50 Self-Reversing Tapping Units

Thank you for purchasing a Tapmatic RCT model. Please read this instruction sheet carefully before using the attachment.

This tool may be used on enclosed machining centers with orienting spindles. Prior to a tool change, it is necessary that the machine spindle rotation stops in the same position each time. Installation procedures are shown on page 7.

PROGRAMMING PROCEDURES

There are two possible methods.

Reduced Cycle Time Programming: allows you to achieve faster cycle times and requires writing a subroutine for the tapping operation. It also improves the life of the tapping attachment's renewable drive parts.

Bore Cycle Programming: It is also possible to use a Standard Bore Cycle such as G85 to tap. This does lengthen cycle time.

Reduced Cycle Time Programming

1.) **Select the proper RPM** for your specific tap and work piece material but *be sure not to exceed the maximum 2500 RPM for your RCT50 tapping attachments.*

Enclosed with this tool are charts showing recommended speeds for common materials. Use these charts and the rules to select the proper speed for your application.

2.) **Calculate The Correct Feed Rate** based on the tap pitch and RPM selected.

Inch Taps: Tap Feed Rate = RPM divided by Pitch
 Example: 1/4"-28 at 2000 RPM
 Tap Feed Rate = 2000 RPM divided by 28 = 71.43 in/min.

Metric Taps: Tap Feed Rate = RPM x Pitch
 Example: M6 x 1 at 2000 RPM
 Tap Feed Rate = 2000 RPM x 1 = 2000 mm/min

3.) **Cancel The Operator's Ability To Adjust Feed Rate And Spindle Speed** using the machine's potentiometer controls. This is normally done by using an M code like M49 for example.

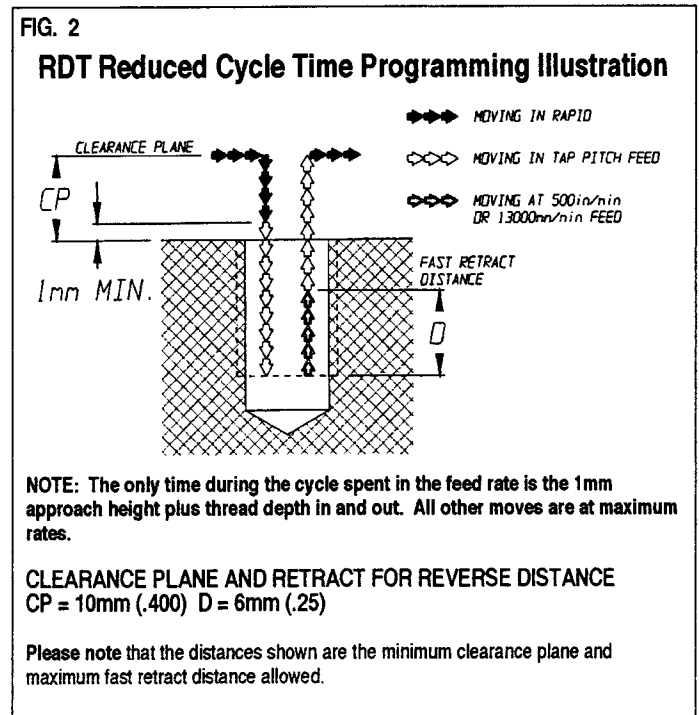
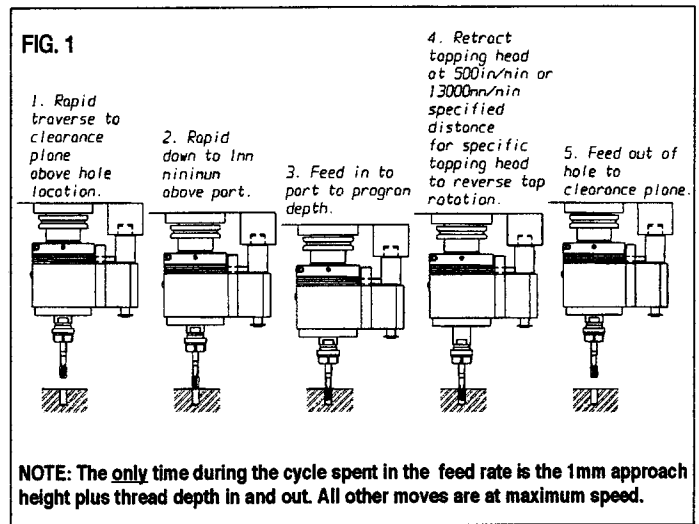
4.) **IMPORTANT: Be Sure "Ramp" or "Exact Stop" Is Eliminated From Program.** These modes cause the cycle time to be significantly slower and also cause the tapping head to run less smoothly. For Example: Machines with Fanuc Controls and Haas Machines use G64 while tapping to eliminate "Exact Stop." G61 will make exact stop modal again for other operations if desired. Fadal Machines use G8 to cancel the Ramp for tapping. G9 will turn the "Ramp" on again if desired for other operations. Your machine may use different G codes. Please check machine manual.

5.) **For Blind Holes: Allow For The Tap To Go Slightly Deeper Than Program Depth.**

For RCT50 Allow an extra .160 or 4mm

The actual extra depth will be less than these values, please check depth on your first hole and then make any necessary adjustment to your program.

6.) **RCT Reduced Cycle Time Programming Illustration**
 Write a subroutine using G01 Feedrate and G00 Rapid movements as shown in FIG. 1. and FIG. 2 below.



PROGRAMMING: RCT50 Self-Reversing Tapping Units

EXAMPLE For INCH

Tapping Unit: RCT50

Tap Size 1/4-20

2000 RPM

Feed Rate In @ 100% = 100 in/min

Sub Routine:

Rapid approach to .040 above part.

Feed in to depth .300 (note actual depth slightly deeper than program depth)

Retract .250 inch at 500 in/min to reverse tap. (*Use maximum Feed Rate

up to 500 in/min)

Feed out to .400 clearance plane at 100% Feed Rate.

MAIN PROGRAM

M06 T6	Tool Change - Tool #6
M00	Program Stop
M03 S2000 RPM.	Spindle Forward ROTATION 2000
G8	Ramp Off (or G64 eliminates exact stop)
G00 G43 Z1.0 H06 M08	Rapid to Z1.0 Height Offset #6 coolant on.
M49	Spindle Speed and Feed Rate override cancel.
G00 G90 X1.0 Y-1.0 Z0.4	Rapid in absolute to hole position X1.0, Y-1.0 and .40 clearance plane.
M98 P4 L1	Repeat sub program 04 one time.
G00 Y-2.0	Rapid to next hole.
M98 P4 L1	Repeat sub program 04 one time.

Sub Program

0004	
G90	Absolute movement.
G00Z.04	Rapid to .04 above hole
G01Z-.30 F100.0	Feed in to hole at 100% Feed Rate.
G01Z-.05 F 500.0	Retract .250 at 500 in/min to reverse tap.
G01Z0.40 F100.0	Feed out of hole to .40 clearance plane.
M99	Return to main program

EXAMPLE For METRIC

Tapping Unit: RCT50

Tap Size M6x1

2000 RPM

Feed Rate In @ 100% = 2000 mm/min

Sub Routine:

Rapid approach to 1mm above part.

Feed in to depth 8mm (note actual depth slightly deeper than program depth)

Retract 6mm at 13000 mm/min to reverse tap. (*Use maximum Feed Rate

up to 13000mm/min)

Feed out to 10mm clearance plane at 100% Feed Rate.

MAIN PROGRAM

M06 T6	Tool Change - Tool #6
M00	Program Stop
M03 S2000 RPM.	Spindle Forward ROTATION 2000
G8	Ramp Off (or G64 eliminates exact stop)
G00 G43 Z25.0 H06 M08	Rapid to Z25.0 Height Offset #6 coolant on.
M49	Spindle Speed and Feed Rate override cancel.
G00 G90 X25.0 Y25.0 Z10.0	Rapid in absolute to hole position X25.0, Y25.0 and 10mm clearance plane.
M98 P4 L1	Repeat sub program 04 one time.
G00 Y-50.0	Rapid to next hole.

Sub Program

0004	
G90	Absolute movement.
G00Z.1.0	Rapid to 1mm above hole
G01Z-8.0 F2000	Feed in to hole at 100% Feed Rate.
G01Z- 2.0 F 13000	Retract 6mm at 13000 mm/min to reverse tap.
G01Z10.0 F2000.0	Feed out of hole to 10mm clearance plane.

VERY IMPORTANT NOTICE

Regarding Ramp or Exact Stop: Please note that the G code for "Exact Stop" or "Ramp" should not be used with a Tapmatic self-reversing tapping attachment. Please be sure that these are not in effect when tapping because they will cause the tapping cycle time to be significantly slower and thread depth repeatability to be less accurate.

Fadal Machines: Use G8 to cancel the Ramp for tapping. G9 will turn the Ramp on again if desired for other operations.

Machines With Fanuc Controls and Haas Machines: Use G64 while tapping to eliminate the Exact Stop. G61 will make Exact Stop modal again for other operations if desired.

Bore Cycle Programming

For Bore Cycle Programming steps 1-5 are the same as in Reduced Cycle Time Programming.

6.) In the main program, use the bore cycle (G85 for example) at each hole location. Be sure to use the proper clearance plane "CP" shown in FIG. 2 for your tapping attachment.

Determining Correct Speed Within Specified Range

Compilation of Guidelines From Tap Manufacturers And Other Sources
For Cutting or Cold-Forming of Threads In Relation To Work Piece Material

Cutting Speed For Tapping: Several factors, singly or in combination can cause very great differences in the permissible tapping speed. The principal factors affecting the tapping speed are the pitch of the thread, the chamfer length on the tap, the percentage of full thread to be cut, the length of the hole to be tapped, the cutting fluid used, whether the threads are straight or tapered, the machine tool used to perform the operation, and the material to be tapped. *From Machinery's Handbook 23rd edition.*

If your coolant does not contain EP additives or its lubrication quality is low, start from the lower speeds in the range. Roll form taps in particular require good lubrication because of the high friction forces involved. As the lubrication

These Factors Apply to <u>Everyone's</u> Tapping Speed				
Ten Factors Requiring Lower Speeds		Ten Factors Permitting Higher Speeds		
-%				+%
-20	Poor Lubrication	1	Good Lubrication	+20
-15	High Tensile Strength Of Material	2	Low Tensile Strength Of Material	+15
-15	Large Thread Diameter	4	Small Thread Diameter	+15
		3		
		5		
		6		
-5	Drill Size More than 65% of Thread	7	Drill Size 65% or Less Thread	+5
-5	Tap Lead Less Than 3.5 Thread	8	Tap Lead More Than 3.5 Threads	+5
-5	Blind Holes	9	Through Holes	+5
-5	Free Running Spindle Inaccurate Pitch Control Hydraulic/Air Feed	10	Synchronous Spindle Lead Screw CNC Control	+5

Example: Tap Size: 1/4"-28 Coated, Material: Aluminum Die Cast, From Chart
688-1375 RPM RPM Spread = 687

MINUS FACTORS		PLUS FACTORS	
High Tensile Strength	-15	Coolant With Good EP	+20
Thread Depth 3 x Dia.	-10	Small Thread Diameter	+15
Drill Size = 75% Thd.	-5	Pitch Fine	+10
Blind Hole	-5	Lead 3.5 Threads	+5
TOTAL		CNC Machine	+5
		TOTAL	+55

Apply The Factors Against The RPM Spread of 687
 +.55 X 687 = 378 Added to minimum RPM 688 = 1066 New Minimum RPM
 -.35 X 687 = 240 Subtracted from maximum RPM 1375 = 1135 New Maximum RPM
Common Sense Rule: Begin with min RPM and work up to optimum efficiency and

Eight Essential Steps For Trouble Free Performance With Self-Reversing Tapping Heads

- Never perform any installation or programming, before reading the operator instructions accompanying the tapping attachment and the machine as well as the tap manufacturers' recommendations.**
 - Choose the proper tap:** Follow your tap manufacturers recommendations for your specific application.
 - Calculate the correct tapping speed** from the adjacent charts and the rules on this page.
 - Common sense rule:** Begin conservatively and increase speed until optimum results are obtained.
 - Select the best tool** for your application or applications.
- High production with one tap size (*Don't compromise*), low production with a variety of taps, (*Choose the tool that best covers range.*)
- Follow our programming instructions exactly, and absolutely make sure ramp or exact stop has been eliminated from tapping cycle.** Leaving it in will increase tapping time 30% increase thread depth variations substantially, and wear out the tapping head prematurely.
 - Follow our installation instructions exactly** and lock orientation collar in place once stop arm is in proper position. Then fix it positively with the locking screw provided.
 - Schedule preventative maintenance.** Disassembly, cleaning, re-lubricating, and reassembly takes no more than half an hour. Just consider what the head does for the machine by eliminating its reversal related wear and tear. Simple maintenance will keep the head working efficiently,

Speed Recommendations & Tool Selection

Standard Taps

Tap Size	Low Carbon Steel, Medium Carbon Steel	High Carbon Steel, High Strength Steel Tool Steel	High Strength Steel, Tool Steel Hardened	Stainless 303, 304, 316	Stainless 410, 430, 17-4 Hardened	Stainless 17-4 Annealed	Titanium Alloys	Nickel Base Alloys	Aluminum Alloys	Aluminum Die Cast	Magnesium	Brass, Bronze	Copper	Cast Iron		
	Surface Feet Per Minute												Uncoated Tap		Coated Tap	
	25-50	6-30 10-35	6-12	12-35 20-50	12-15	12-15 12-25	3-15	10-15	50-65	40-65 45-90	45-100	30-65	50-60 65-100	35-50 50-65		
	RPM Range Uncoated RPM Range Coated Recommended Tapmatic Attachment															
M2	0	1592-3183 3183-5093 RDT15HS	382-1910 637-2228 RDT15HD	382-764 RDT15HD	764-2228 1273-3183 RDT15HD	764-955 RDT15HD	764-955 764-1592 RDT15HD	191-955 RDT15HD	637-955 RDT15HD	3183-4138 RDT15HS	2546-4138 2865-5730 RDT15HS	2865-6000 RDT15HS	1910-4138 RDT15HS	3183-3820 4138-6000 RDT15HS	2228-3183 3183-4138 RDT15HS	
	1	1308-2617 2617-4186 RDT15HS	314-1570 523-1831 RDT15HD	314-628 382-764 RDT15HD	628-1831 1047-2617 RDT15HD	628-785 RDT15HD	628-785 628-1308 RDT15HD	157-785 RDT15HD	523-785 RDT15HD	2617-3401 RDT15HD	2093-3401 2355-4710 RDT15HS	2355-5233 RDT15HS	1570-3401 RDT15HD	2617-3140 3401-5233 RDT15HS	1831-2617 2617-3401 RDT15HD	
	2	1110-2221 2221-3554 RDT15HD	267-1333 444-1555 RDT15HD	314-628 RDT15HD	533-1555 888-2221 RDT15HD	533-666 RDT15HD	533-666 533-1110 RDT15HD	133-666 RDT15HD	444-666 RDT15HD	2221-2887 RDT15HD	1777-2887 1999-3999 RDT15HD	1999-4442 RDT15HD	1333-2887 RDT15HD	2221-2665 2887-4442 RDT15HD	1555-2221 2221-2887 RDT15HD	
M3	3	964-1929 1929-3086 RDT15HD	231-1157 386-1351 RDT15HD	231-463 RDT15HD	463-1351 772-1929 RDT15HD	463-579 RDT15HD	463-579 463-964 RDT15HD	116-579 RDT15HD	386-579 RDT15HD	1929-2508 RDT15HD	1543-2508 1736-3472 RDT15HD	1736-3858 RDT15HD	1157-2508 RDT15HD	1929-2315 2508-3858 RDT15HD	1351-1929 1929-2508 RDT15HD	
	4	853-1705 1705-2728 RDT25HD	205-1023 341-1194 RDT25HD	205-409 RDT25HD	409-1194 682-1705 RDT25HD	409-512 RDT25HD	409-512 409-853 RDT25HD	102-512 RDT25HD	341-512 RDT25HD	1705-2217 RDT25HD	1364-2217 1535-3069 RDT25HD	1535-3411 RDT25HD	1023-2217 RDT25HD	1705-2046 2217-3411 RDT25HD	1194-1705 1705-2217 RDT25HD	
	5	764-1528 1528-2445 RDT25HD	183-917 306-1070 RDT25HD	183-367 RDT25HD	367-1070 611-1528 RDT25HD	367-458 RDT25HD	367-458 367-764 RDT25HD	92-458 RDT25HD	306-458 RDT25HD	1528-1986 RDT25HD	1222-1986 1375-2750 RDT25HD	1375-3056 RDT25HD	917-1986 RDT25HD	1528-1833 1986-3056 RDT25HD	1070-1528 1528-1986 RDT25HD	
M4	6	691-1382 1382-2211 RDT25HD	166-829 277-969 RDT25HD	166-332 RDT25HD	332-969 553-1382 RDT25HD	332-415 RDT25HD	332-415 332-691 RDT25HD	83-415 RDT25HD	277-415 RDT25HD	1382-1799 RDT25HD	1106-1799 1246-2487 RDT25HD	1246-2764 RDT25HD	829-1799 RDT25HD	1382-1658 1799-2764 RDT25HD	969-1382 1382-1799 RDT25HD	
	8	583-1185 1185-1884 RDT25HD	140-699 233-815 RDT25HD	140-280 RDT25HD	280-815 466-1165 RDT25HD	280-349 RDT25HD	280-349 280-583 RDT25HD	70-349 RDT25HD	233-349 RDT25HD	1165-1514 RDT25HD	932-1514 1048-2097 RDT25HD	1048-2330 RDT25HD	699-1514 RDT25HD	1165-1398 1514-2330 RDT25HD	815-1165 1165-1514 RDT25HD	
	10	502-1005 1005-1607 RDT25HD	121-603 201-704 RDT25HD	121-241 RDT25HD	241-704 402-1005 RDT25HD	241-302 RDT25HD	241-302 241-502 RDT25HD	60-302 RDT25HD	201-302 RDT25HD	1005-1307 RDT25HD	804-1307 905-1808 RDT25HD	905-2009 RDT25HD	603-1307 RDT25HD	1005-1205 1307-2009 RDT25HD	704-1005 1005-1307 RDT25HD	
M5	12	442-884 884-1415 RDT25HD	106-531 177-619 RDT25HD	106-212 RDT25HD	212-619 354-884 RDT25HD	212-265 RDT25HD	212-265 212-442 RDT25HD	53-265 RDT25HD	177-265 RDT25HD	884-1150 RDT25HD	707-1150 796-1592 RDT25HD	796-1769 RDT25HD	531-1150 RDT25HD	884-1061 1150-1769 RDT25HD	619-884 884-1150 RDT25HD	
	1/4	382-764 764-1222 RDT50HD	92-458 153-535 RDT50HD	92-183 RDT50HD	183-535 306-764 RDT50HD	183-229 RDT50HD	183-229 183-382 RDT50HD	46-229 RDT50HD	153-229 RDT50HD	764-993 RDT25HD	611-993 688-1375 RDT25HD	688-1528 RDT25HD	458-993 RDT50HD	764-917 993-1528 RDT25HD	535-764 764-993 RDT50HD	
	5/16	306-611 611-978 RDT50HD	73-367 122-429 RDT50HD	73-147 RDT50HD	147-429 245-611 RDT50HD	147-184 RDT50HD	147-184 147-306 RDT50HD	37-184 RDT50HD	122-184 RDT50HD	611-796 RDT50HD	489-796 551-1100 RDT50HD	551-1222 RDT50HD	367-796 RDT50HD	611-733 796-1222 RDT50HD	429-611 611-796 RDT50HD	
M6	3/8	255-509 509-815 RDT50HD	61-306 102-357 RDT50HD	61-122 RDT50HD	122-357 204-509 RDT50HD	122-153 RDT50HD	122-153 122-255 RDT50HD	31-153 RDT50HD	102-153 RDT50HD	509-662 RDT50HD	407-662 458-917 RDT50HD	458-1019 RDT50HD	306-662 RDT50HD	509-611 662-1019 RDT50HD	357-509 509-662 RDT50HD	
	7/16	219-437 437-698 RDT50	52-262 87-306 RDT85HS	52-105 RDT85HS	105-306 175-437 RDT85HS	105-131 RDT85HS	105-131 105-219 RDT85HS	26-131 RDT85HS	87-131 RDT85HS	437-568 RDT85HS	349-568 393-786 RDT50HD	393-873 RDT50HD	262-568 RDT85HS	437-524 568-873 RDT50HD	306-437 437-568 RDT85HS	
	1/2	191-382 382-611 RDT85HS	46-229 76-267 RDT85HS	46-92 RDT85HS	92-267 153-382 RDT85HS	92-115 RDT85HS	92-115 92-191 RDT85HS	23-115 RDT85HS	76-115 RDT85HS	382-497 RDT85HS	306-497 344-688 RDT85HS	344-764 RDT85HS	229-497 RDT85HS	382-458 497-764 RDT85HS	267-382 382-497 RDT85HS	
M7	9/16	172-344 344-550 RDT85HS	41-206 68-238 RDT85HS	41-82 RDT85HS	82-238 137-344 RDT85HS	82-102 RDT85HS	82-102 82-172 RDT85HS	20-102 RDT85HS	68-102 RDT85HS	344-442 RDT85HS	275-442 306-619 RDT85HS	306-687 RDT85HS	206-442 RDT85HS	344-412 442-687 RDT85HS	238-344 344-442 RDT85HS	
	5/8	153-306 306-489 RDT85	37-183 61-214 RDT85	37-73 RDT85	73-214 122-306 RDT85	73-92 RDT85	73-92 73-153 RDT85	18-92 RDT85	61-92 RDT85	306-397 RDT85	244-397 275-550 RDT85	275-611 RDT85	183-397 RDT85	306-367 397-611 RDT85	214-306 306-397 RDT85	
	3/4	128-255 255-407 RDT85	31-153 51-178 RDT85	31-61 RDT85	61-178 102-255 RDT85	61-76 RDT85	61-76 61-128 RDT85	15-76 RDT85	51-76 RDT85	255-331 RDT85	203-331 229-458 RDT85	229-509 RDT85	153-331 RDT85	255-306 331-509 RDT85	178-255 255-331 RDT85	
M8	7/8	109-218 218-350 RDT85	26-131 44-153 RDT85	26-52 RDT85	52-153 87-218 RDT85	52-65 RDT85	52-65 52-109 RDT85	13-65 RDT85	44-65 RDT85	218-284 RDT85	175-284 196-392 RDT85	196-437 RDT85	131-284 RDT85	218-262 284-437 RDT85	153-218 218-284 RDT85	
	1	96-191 191-306 RDT85	23-115 38-134 RDT85	23-46 RDT85	46-134 76-191 RDT85	46-57 RDT85	46-57 46-96 RDT85	11-57 RDT85	38-57 RDT85	191-248 RDT85	153-248 172-344 RDT85	172-382 RDT85	115-248 RDT85	191-230 248-382 RDT85	134-191 191-248 RDT85	
	1															



