

## **Signalling Revision Questions: Points (with answers)**

1. The HW4000 is the next generation of the HW range, what is the main change from the other HW's?

THIS MODEL IS POWERED AT 110V AC

2. Which part of a HW machine is the 'throw-bar'?

MAIN BAR WHICH GOES THROUGH CENTRE OF MACHINE, THIS UNLOCKS AND LOCKS THE LOCKING SLIDE

3. Which part of the HW machine is the 'lock-dog'?

THE SQUARE STEEL BLOCK ATTACHED TO THE LOCKING SLIDE THAT ACTUALLY GOES THROUGH THE LOCK BLADES AND LOCKS THE POINTS

4. Would loss of detection in a HW cause the motor to drive (like clamplocks)?

YES, NOT ALL THE TIME, THIS WOULD ONLY HAPPEN ON MTCE, WHEN BOTH THE MOTOR CONTACTS MAKE AT THE SAME TIME & PROVIDE A PATH, HOWEVER THE MOTOR MUST NEVER TRY & DRIVE THE OPPOSITE WAY

5. Name one of the symptom's that would be noticeable if a diode should fail in the diode block?

POINT SNUBBING WOULD FAIL & SWITCH BLADE WOULD HIT THE STOCK RAIL HARD

6. What was the model number of the proto-type HW machine?

HW 55s

7. What is the voltage range of a HW1000?

30-120V DC

8. What is the voltage range of a HW2000?

90-120V DC

9. Why wouldn't you find a HW1000 on OHL area's?

THEY ARE NOT AC IMMUNE

10. What is the maximum stroke of a HW machine?

152MM, BUT THE DRIVE STROKE MUST NEVER EXCEED 120MM

11. Which types of clamplocks would you find the following type of lock arms:

A6? VERTICAL PLAIN LEAD

B6? DOUBLE/SINGLE SLIPS

C6? SWITCH DIAMONDS

D6? SWITCH DIAMONDS (DEPENDS ON ANGLE OF RAIL, IF 'C6' CANNOT BE USED)

E6? UIC 54B RAIL

F6? INCLINED PLAIN LEAD

12. What does a snorkel valve prevent?

PREVENTS AIR ENTERING PUMP INLET PORT IF THE OIL LEVEL DROPS BELOW FILLER CAP LEVEL.

13. What is the main cause of derailments over Clamplocks?

AIR IN RAMS, FLUID CAN BE COMPRESSED, AIR CANNOT

14. What is a 'POCV' & what does this prevent?

PILOT OPERATED CHECK VALVE, DETECTS FLUID LEAVING ONE RAM BEFORE IT ALLOWS THE OTHER RAM TO FILL UP

15. Where is the fixed cam and the adjustable cam on the clamplocks and what do each cam signify when correctly set up?

FIXED CAM IS FIXED TO DRIVE LOCK SLIDE AND DETECTS POSITION OF IT, THE ADJ CAM IS ATTACHED TO DETECTOR SLIDE, AND DETECTS POSITION OF THE LOCK ARM

16. The 'A6' modification is an uncommon term for what changes for the clamplock in the 80's?

MAINLY THE INTRODUCTION OF THE FORCE-DOWN FEATURE, AND THE CHANGING OF THE LOCK ARM PIN BUSH FROM RUBBER TO BRASS

17. Before arranging the parts for a refit of switch diamonds, what information MUST you have (from the track) before ordering/sorting the parts?

THE ANGLE OF THE TRACK (IE: 1 IN 17)

18. An invention in which a line was scored down the side of a lock arm was to signify what? (later abolished).

POINTS HAVE BEEN RUN-THROUGH, WAS TO SHOW LOCK ARM BENT, BUT NOT VERY RELIABLE

19. Why do we use a 1.5mm gauge on all FPL locks?

TO ENSURE LOCK GOES THROUGH WITH SLIGHT PLAY SO THE BLADES ARE NOT DAMAGED/CLAMPLOCK LOCKARM WILL LOCK.

20. In which blade should the FPL gauges be inserted first on a HW operated set and why? FURTHEST SWITCH RAIL FROM MACHINE, AS ADJUSTMENT ON FIXED BLADE WILL ALTER ADJUSTABLE BLADE TOO

21. On a M3a machine, what should you check before adjusting the lock blades?

WHICH BLADE IS FIXED/ADJUSTABLE, UNLKE THE HW THEY DIFFER & CAN BE THE OTHER WAY ROUND

22. What does the WJR do?

TIMES THE POINT OPERATION, AND WILL CUT FEED TO MOTOR IF IT TAKES LONGER THAN BETWEEN 7-9 SECS TO MOVE AND RELOCK.

23. What does the WZR signify to the interlocking?

THE POINTS ARE FREE TO MOVE (NOT LOCKED VIA INTERLOCKING)

24. TRUE or FALSE: the manual switch on a set of points that fails to cut off the feed to the motor is a wrong-side failure?

TRUE

25. What is the purpose of 'snubbing'?

TO SLOW THE MACHINE ON FIT-UP, IT USES BACK EMF AS A BRAKING METHOD

26. What is meant by 3 or 4 wire operation, and where would you find it?

HW 1000 ARE 3 OR 4 WIRE OPERATED, ONLY HW2000 & 4000 ARE 4 WIRE ONLY – SOME MACHINES HAVE TWO SEPARATE 'NEG' & 'POS' WIRES.

27. Can you always use the 4-way moulded cables on clamplock bodies?

NO, THE CABLE LEAVING MUST MATCH THE OTHER SIDE, THIS IS NOT ALWAYS SO

28. Where would you find 'independent lock blades'?

ON DOUBLE SLIPS

29. Where shouldn't high-thrust green or blue rams be used?

ON BULL HEAD RAIL

30. What are self-restoring points?

THESE ARE USUALLY TRAPS THAT WILL DRIVE BACK NORMAL AFTER PASSAGE OF THE TRAIN WITHOUT INTERVENTION OF THE SIGNALLER

31. What is the measurement at which the centre of the detection mechanism of an HW should be from the running edge of the rail?

39" +/- 0.5" (TO ENSURE THE RODS WILL HAVE ENOUGH ADJUSTMENT ON THE THREADS)

32. What is 'springing of the toe'?

BY CHECKING THE FORCE IN WHICH THE SWITCH RAIL FITS UP TO THE STOCK RAIL, EXCESSIVE FORCE WILL DAMAGE MACHINE, OR BREAK STRETCHER &/OR SHOE

33. What type of machine is the only one to use a drive belt?

M63

34. What is the switch opening tolerance (max and min) for the following:

a) Machines plain lead? 102-120MM

b) Machines switch diamonds? 102-120MM

c) Clamplocks plain lead? 105-110MM

d) Clamplocks switch diamonds? 82-87MM

e) Mech points? 102-120MM

35. The locking mechanism on an 'ML' machine (very rare, but still local), is different to any other point machine, why?

**IT DROPS INTO THE LOCK BLADE RATHER THAN SLIDES THROUGH**

36. Apart from the colour, what is the other main difference between a cream diode block and a red diode block?

**THE CREAM BLOCK HAS SIX WIRES, AND THE RED HAS FOUR**

37. On mechanical points, what is the purpose of the barrel adjuster, and which part of the rodding should it be installed?

**TO LENGTHEN/SHORTEN THE DRIVE RODDING AND SHOULD BE INSTALLED FROM FINAL DRIVE CRANK TO DRIVE LUG**

38. What is a compensator and what is its main purpose?

**IT'S A SPECIAL CRANK IN TWO PARTS FIXED TOGETHER IN THE MAIN RUN THAT ALLOWS THE RODDING TO EXPAND AND CONTRACT ACCORDING TO THE WEATHER. IT'S POSITIONING IS DETERMINED BY WORKING OUT PUSH & PULL MATHEMATICS.**

39. Before cutting the notches out of a mechanical fender, what must be drilled first and why?

**COPE HOLES, SO NO CORNERS ARE PRESENT, SO TO PREVENT CRACKING**

40. The adjusting nuts on the drive lug (in the four foot of a mech set of points) are used for what?

**TO BALANCE THE DRIVE, IE TOO MUCH NORMAL DRIVE CAN BE TURNED INTO MORE REVERSE IF NORMAL IS TOO HARD AND REVERSE IS NOT ENOUGH**

41. How is more 'drive' gained on a mechanical set of points?

**ON THE 12X16" CRANK AT DRIVE BENCH, MOVE SLIDING SLEEVE**

42. What is 'Lost Motion' better known as and what is it?

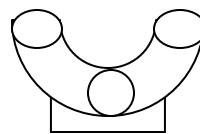
**BETTER KNOWN AS 'THE ESCAPEMENT' FOUND ON THE REAR DRIVE LUG FOR BACKDRIVE, THIS WILL ENSURE THE BACKDRIVE WILL NOT TRAVEL FIRST AND THAT A TRAIN PASSING OVER THE POINTS WILL NOT PUT EXTREME STRESS ON THE SWITCHES IF THERE IS A LARGE RSO.**

43. On the latest [Mk 4] TOP's (train operated points) what is the time tolerance for the points to restore to normal?

**15-30 SECS**

44. Draw a diagram for the following cranks and state their purpose;

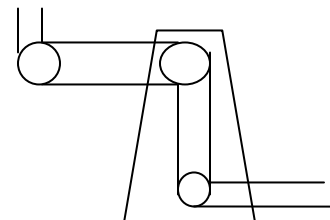
**Accommodating crank;**



Used for; **FOR RODDING CONNECTION AROUND A 90 DEGREE ANGLE**

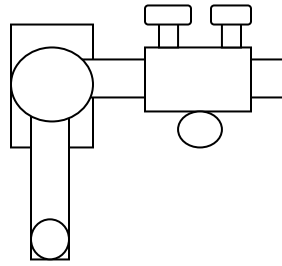
**Pedestal crank;**

*Viewed from the side,  
with one side removed*



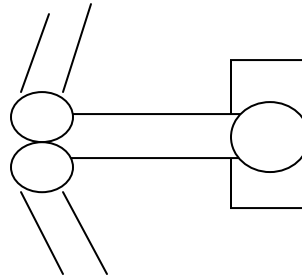
Used for; **ONLY FOUND UNDER SB, USED FOR CONVERTING RODDING FROM VERTICAL TO HORIZONTAL**

**12" X 16" crank,**



Used for; **MAIN DRIVE CRANK, TO ADJUST DRIVE**

**Relief crank,**



Used for; **WHERE RODDING RUN IS NOT STRAIGHT AND NEEDS TO CURVE (BUT NOT AS SHARP AS A CORNER).**

45. Why are the insulations on the stretchers on switch diamonds always in the central position?  
**TO PREVENT TC FAILURES IF ANY LONG METAL OBJECT IS LAID ACROSS BOTH ENDS**
46. A spacing collar **MUST** be installed on the detection arm assembly on switch diamond's, what is the size of this collar & why?  
**19MM, THE ADJ CAM IS SHORTER AS THE SWITCH OPENING IS NARROWER**
47. How many types of centre thrust brackets are there for clamplocks:  
a) 1?  
b) 2?  
c) 3?  
d) 4?  
e) 5?  
**THERE ARE FIVE:**  
1) **PLAIN LEAD HEATERS NOT FITTED**  
2) **PLAIN LEAD HEATERS FITTED**  
3) **UIC 54B RAIL**  
4) **SWITCH DIAMONDS TYPE B1**  
5) **SWITCH DIAMONDS TYPE B2**
48. What is taper packing used for in Clamplocks?  
**IT IS USED TO MAKE THE SWITCH RAIL BRACKET PARALLEL TO THE SWITCH RAIL. (FITTED TO ALL PLAIN-LEAD SETS, AND *SOME* SWITCH DIAMONDS)**
49. What are Half lock nuts on adjustable stretchers?  
**THESE ARE THE 'OLD' STYLE NUTS IN WHICH THERE ARE TWO NUTS LOCKED TOGETHER, THE HALF NUT IS THE LOCKING NUT WHICH IS HALF THE SIZE OF THE OTHER NUT.**

50. What are hardlock nuts on adjustable/yellow stretchers?  
THESE ARE NUTS WHICH LOCK TOGETHER USING A CONCAVE INSIDE.
51. What is the torque setting for hardlock nuts on the rail for installation?  
250Nm
52. What is the torque setting for hardlock nuts on the rail for maintenance?  
200Nm
53. What are the Pway track gauge tolerances for Bull Head Rail, Flat bottomed Vertical Rail and Flat bottomed Inclined Rail?  
BH: 1433-1441mm, FBV: 1430-1438mm, FBI: 1433-1441mm
54. What is the latest document for setting up stretchers?  
TRK/1202 (FOR SHORT)
55. What is Flange Back Contact (FBC) & what causes it?  
IT IS CAUSED BY THE OUTSIDE OF THE TRAIN WHEEL HITTING THE INSIDE OF THE SWITCH RAIL CAUSED BY INCORRECTLY SET FWC DUE TO A WIDE GAUGE TRACK.
56. How can FBC be prevented or cured?  
THE STRETCHERS MUST BE SET CORRECTLY USING TRK/1202
57. What is Contraflexure Rail?  
WHEN THE TURNOUT OF A SET OF POINTS GOES OVER THE HIGH LEG (THIS INCREASES RISK OF FBC)
58. What is Simular Flexure Rail?  
WHEN THE TURNOUT OF A SET OF POINTS GOES OVER THE LOW LEG
59. What is Free-wheel Clearance (FWC), and how is this set?  
THIS IS THE PASSAGE OF WHICH THE WHEEL WILL RUN BETWEEN THE INSIDE OF THE SWITCH & STOCK RAIL'S
60. What is the very minimum FWC?  
AT THE MOMENT ONLY SINGLE & DOUBLE SLIPS CAN GO DOWN TO 45mm, ALL OTHER SETS SHOULD BE MINIMUM 50mm AT THE END OF THE PLANING.
61. What is Supplementary detection & where would you find one?  
USED ON NEWLY INSTALLED POINTS (WHEN INSTALLED ON CONCRETE SLEEPERS, THIS IS AN EXTRA BR998 DETECTOR POSITIONED AT THE MID-REAR AREA TO DETECT THAT THE WHOLE SWITCH RAIL IS UP. THERE MAYBE MORE THAN ONE DEPENDING ON SWITCH LENGTH.
62. What gauges are used for setting up a supplementary detector?  
6/8mm GAUGE IN SWITCH RAIL, 1.5/2mm IN TAPPETS
63. How would you determine the length & type of switch rail?  
THE REAR 'GAUGE' BLOCKS BETWEEN THE SWITCH AND STOCK RAIL WILL STATE THE TYPE OF RAIL AND ITS LENGTH
64. Which part of a stretcher is the kicking strap and what is its purpose, and what should clearances be?  
THE STRAPS ARE THE EXTENDED PARTS OF THE LONG STRETCHER, THEY ARE TO ENSURE THE SWITCH RAIL WILL NEVER LIFT BEYOND THE STOCK RAIL AND THE CLEARANCES ARE 3-6mm FOR NON-SCHWIHAG SWITCHES AND 6-9mm FOR THOSE FITTED WITH SCHWIHAGS.
65. Can Mechanical lock stretchers be used again once cut?  
NO, ONCE THEY FAIL FPLT THEY SHOULD BE REPLACED (UNLESS TRACK GAUGE CAN BE ALTERED TO ALLOW IT TO PASS – DEPENDANT ON SWITCH OPENINGS).
66. A clamplock fluid indicator in filler cap means what when the fluid is on 'yellow'?  
FLUID IS OK, IT ONLY NEEDS TOPPING UP WHEN ON RED.
67. Where on mechanical rodding MUST you only lose/gain stroke?  
ONLY AT THE DRIVE CRANK, YOU MUST NEVER GAIN IT ANYWHERE ELSE, YOU CAN ALTER GAIN UNDER SB, MUST THIS IS A MAJOR ALTERATION AND IS NOT NORMALLY CARRIED OUT DURING MTCE. IT CAN ALTER DRIVE SIGNIFICANTLY.

68. Why are there two springs in the LH cam follower as opposed to just one in the RH side?  
A DESIGN ON THE LH CAM FOLLOWER WAS INCORPORATED TO STOP THE POINTS UNLOCKING IF HYDRAULIC PRESSURE IS LOST, IT RELIES ON THE DOUBLE SPRING TO KEEP IT FORCED DOWN.
69. A HW type set of points is thrown and the motor spins but the switches do not move, what is the problem?  
THE CLUTCH HAS FAILED, IT IS EITHER DISCONNECTED OR INCORRECTLY SET-UP.
70. State the clamplock tappet positions when at;  
Points locked & detected LH DOWN, RH UP  
Points at mid-position BOTH DOWN  
Points open (other side locked and detected). LH UP, RH DOWN
71. On HW new installations, the motor circuit main cable is kept separate from the detection cable (1x4c: motor and 1x 12c: detection) why?  
IT IS KEPT SEPARATE AS THE 110V SUPPLY MAY FEED THE DETECTION CIRCUIT FALSELY.
72. Where are the 'datum' marks on HW type machines and what are they used for?  
THEY ARE SITUATED ON THE DETECTION AND FPL BLADES AND USED INITIALLY ON INSTALLATION TO COARSELY SET THE BLADES BEFORE ADJUSTMENT USING GAUGES.
73. How would you determine vertical rail and inclined rail?  
BY LOOKING ON THE SLIDE CHAIRS OR REAR GAUGING BLOCKS AND WILL STATE EITHER 'V' FOR VERTICAL OR 'X' FOR INCLINED RAIL.
74. What is meant by the 'force-down' feature on clamplocks?  
THIS IS ONE OF THE 'A6' MODIFICATIONS DONE IN THE EIGHTIES WHICH ENSURED THE LOCK ARM DROPPED BY FORCE WHEN UNLOCKED AND NOT ORIGINALLY BY GRAVITY IN WHICH IT REGULARLY FAILED TO DO SO.
75. Why is there escapement on the drive of all machines at the drive lug on the stretcher?  
TO ENABLE THE POINTS TO UNLOCK/RELOCK FIRST BEFORE THEY DRIVE.