Norfolk Southern

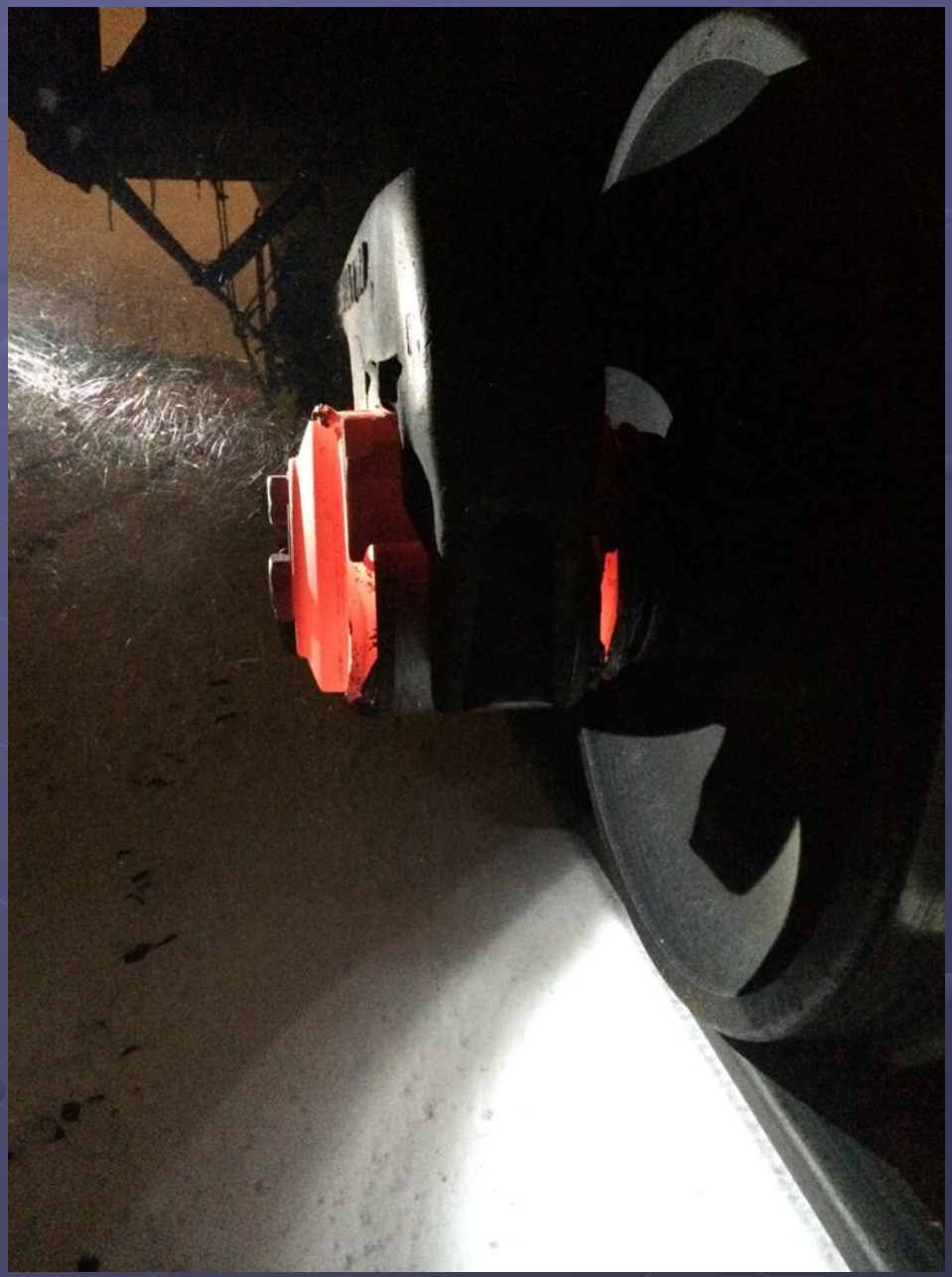
TRAINING PRESENTATION

HBD/HWD/DED Wayside Detection Systems

Why use Wayside Detection?

Good HBD Stop

Good HBD Stop



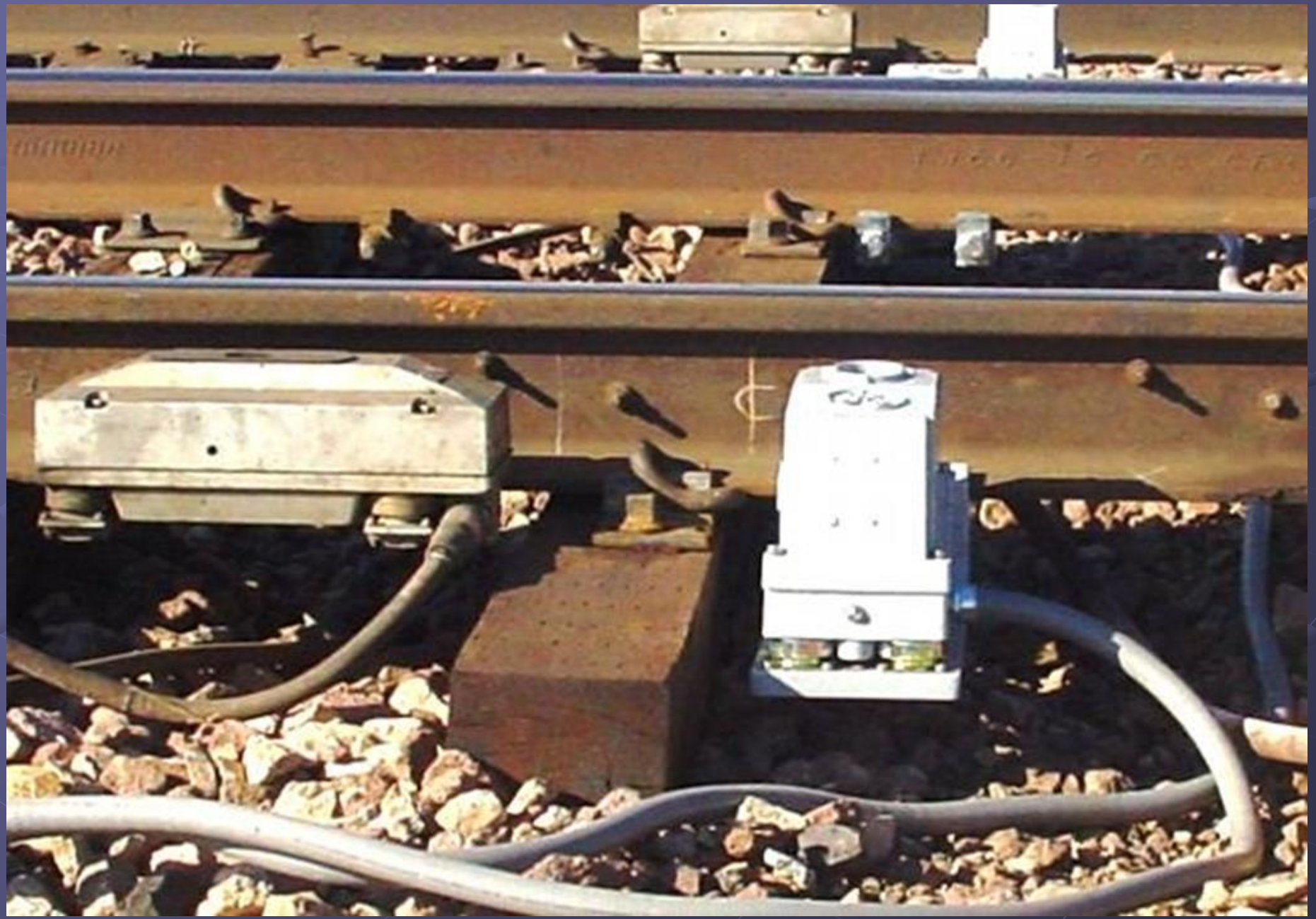
Good HBD Stop

Good DED Stop

Detector Types

- HBD – Hot Box Detector
- HWD – Hot Wheel Detector
- DED – Dragging Equipment Detector
- HCD – Hi-Car Detector
- Wide – Wide Car Detector

HBD/HWD (Micro)



HBD/HWD (NG)

DED

HCD & Wide

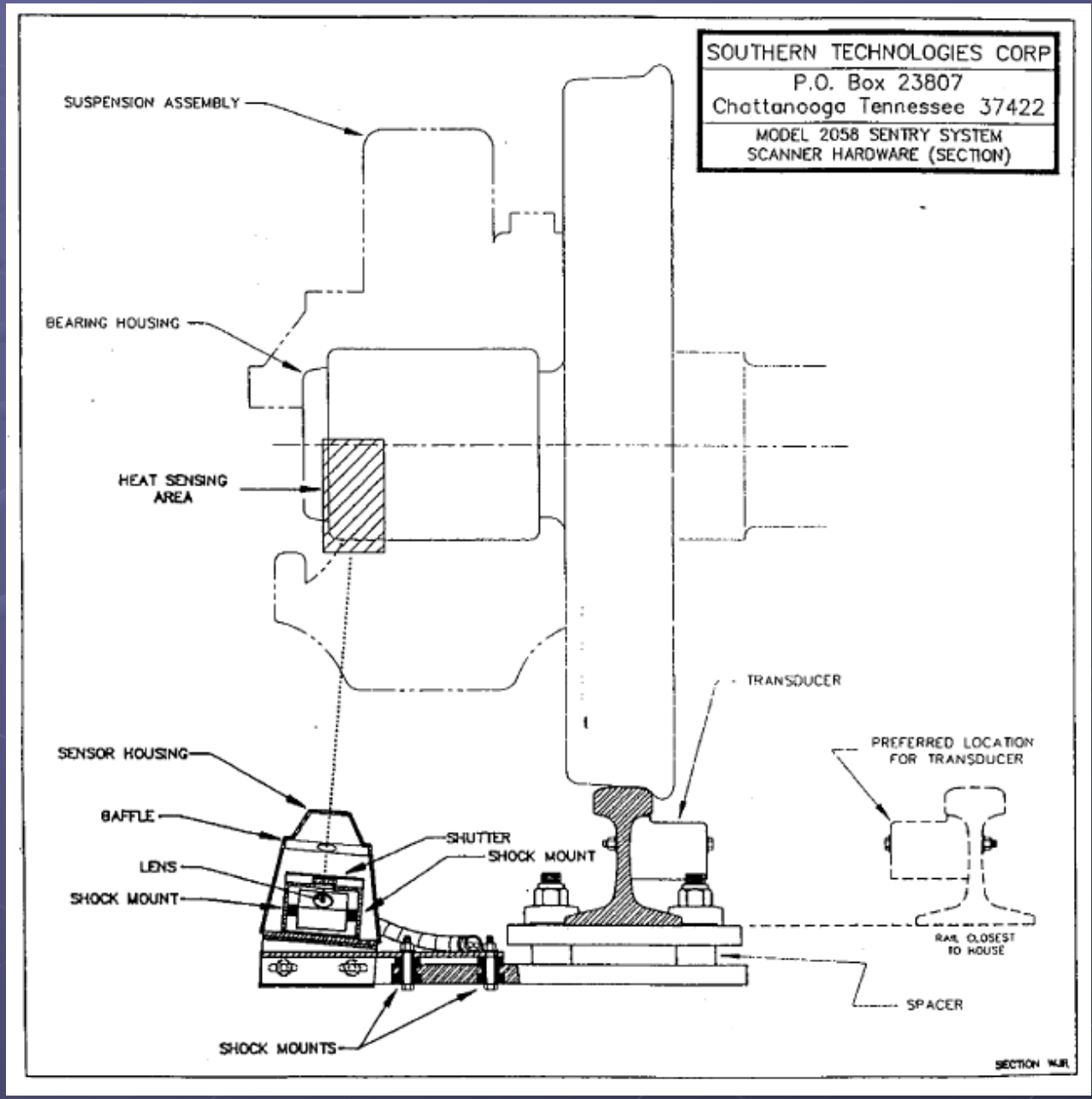
Different Detector Manufactures

Bearing Alerts – Hot Box Detectors (HBD)
**All temperatures are in degrees Fahrenheit

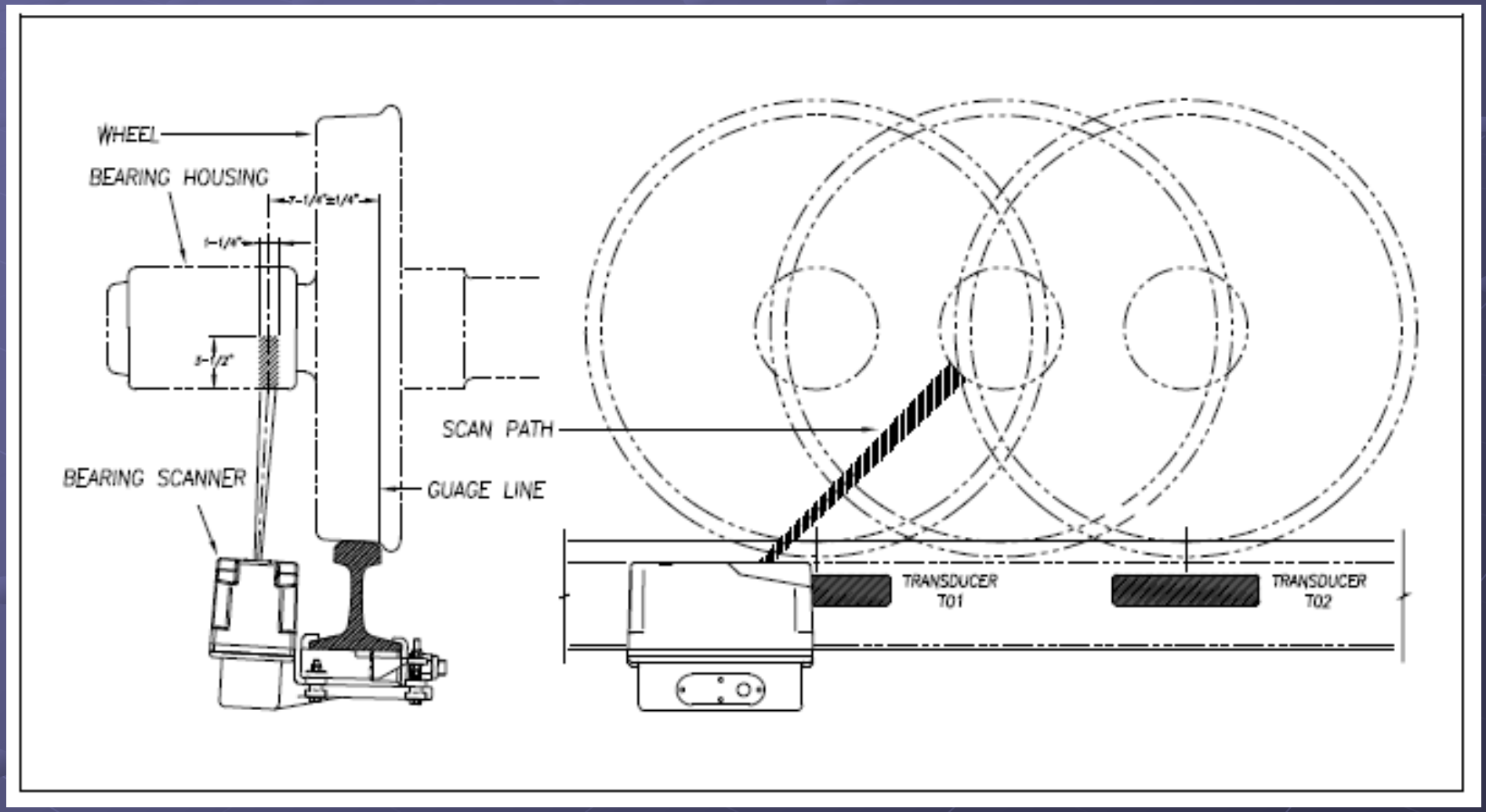
	Southern Tech Sentry	Southern Tech NG	Progress Rail Micro	Talker Radio Message?
Absolute (Critical)	140	200	200	Yes
Differential (Non-Critical)	95	115	115	No – Wayside Desk Notification Only
Warm Bearing (Non-Critical)	120	170	170	Yes

1. There are three (3) models of Hot Box Detectors (HBDs) deployed across the Norfolk Southern System
    a. Southern Technologies – Sentry
    b. Southern Technologies – NG
    c. Progress Rail – Micro
        i. Note: Southern Tech Sentry detectors measure temperature at a different point on the bearing. This accounts for the lower temperature threshold on this detector.
2. All temperature readings from the detectors represent the temperature of the bearing above ambient (temperature above the outside air temperature at the time of the reading)
3. Absolute (Critical) and Warm Bearing (Non-Critical) indicates the temperature of a single bearing
4. Differential (Non-Critical) indicates the difference in temperature between the two bearings on the same wheel set

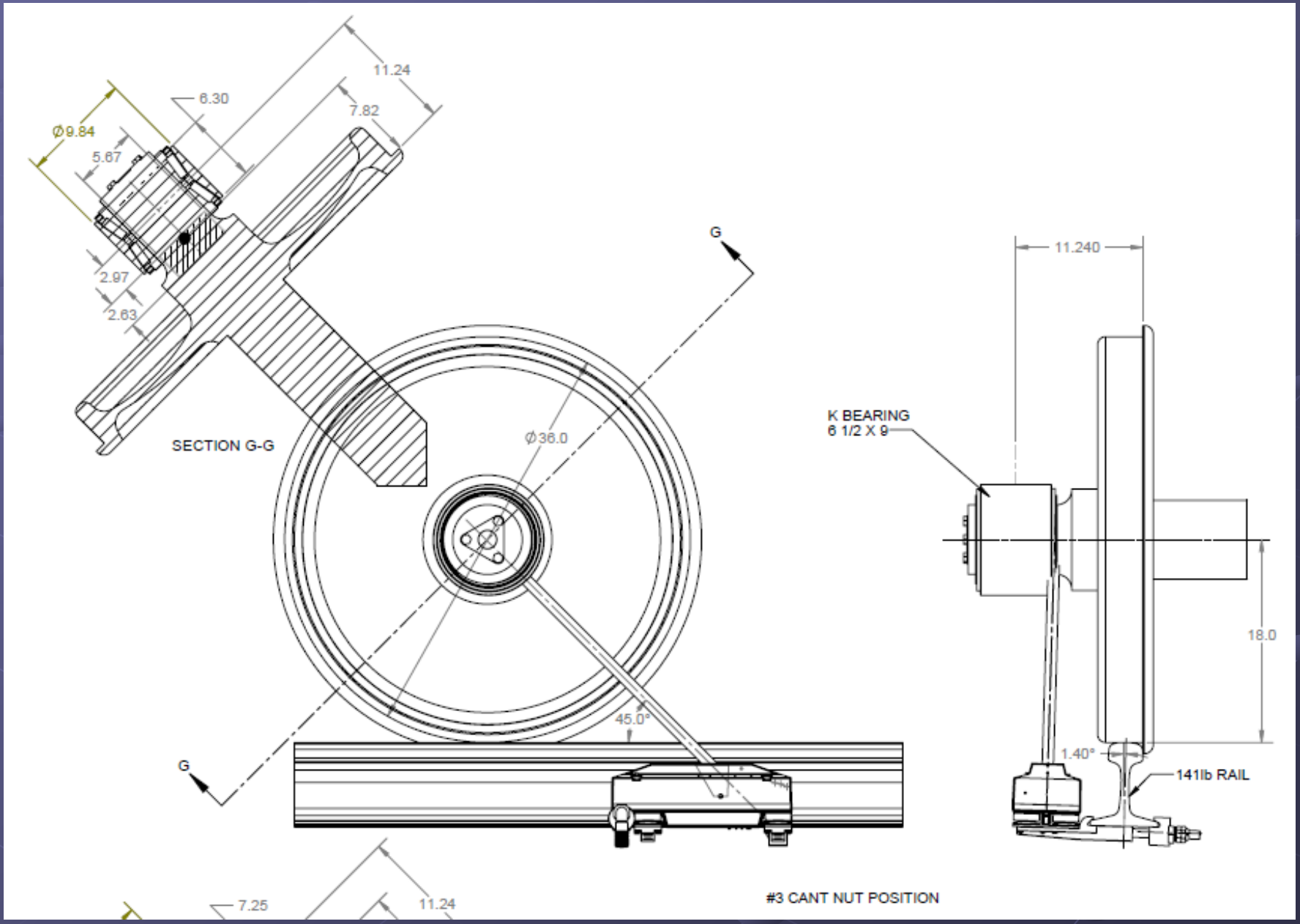
Southern Tech Sentry



Southern Tech NG



Progress Rail Micro



Various Bearing sizes

Wayside Detectors

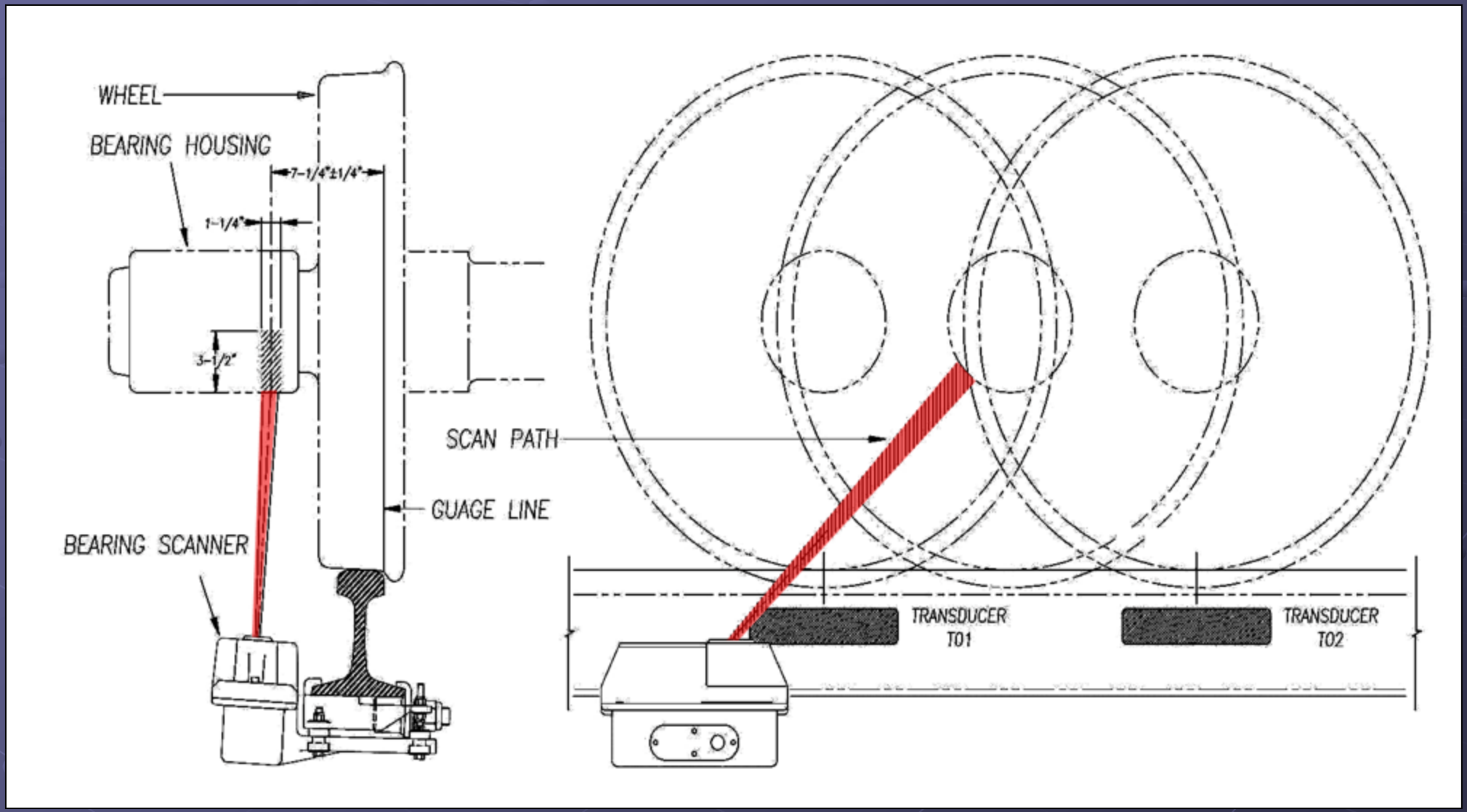
HOT BOX DETECTOR

- Installation
- Operation
- Troubleshooting

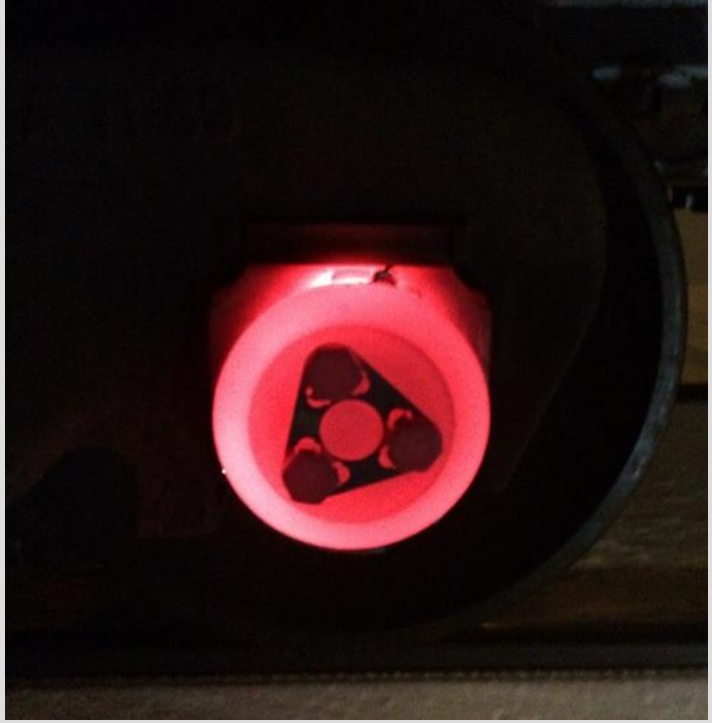
Wayside Detectors

TRACK HARDWARE

Bearing Scan Process



Bearing Scan Process



DSR/Heat Profiles Bearing Scanner

Gate Transducers are 24” Apart

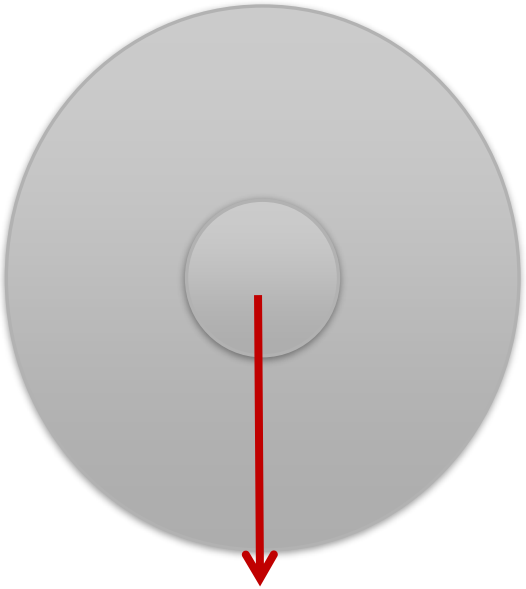
Direction of Travel

Leading Transducer

24 “

Trailing Transducer

BEGIN - Bearing Temperature Measurements

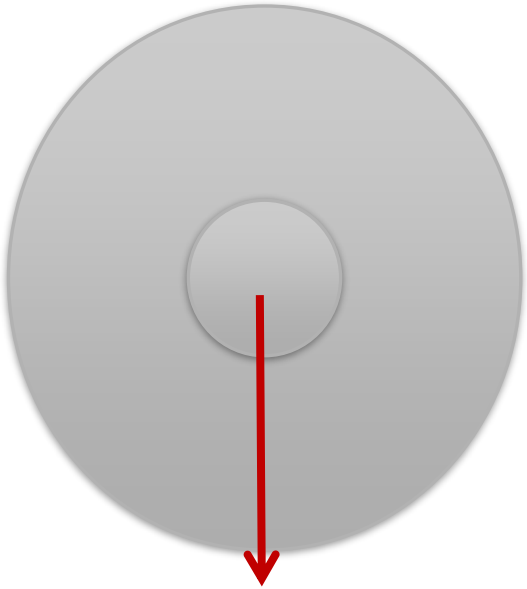


Leading Transducer

24 “

Trailing Transducer

END - Bearing Temperature Measurements

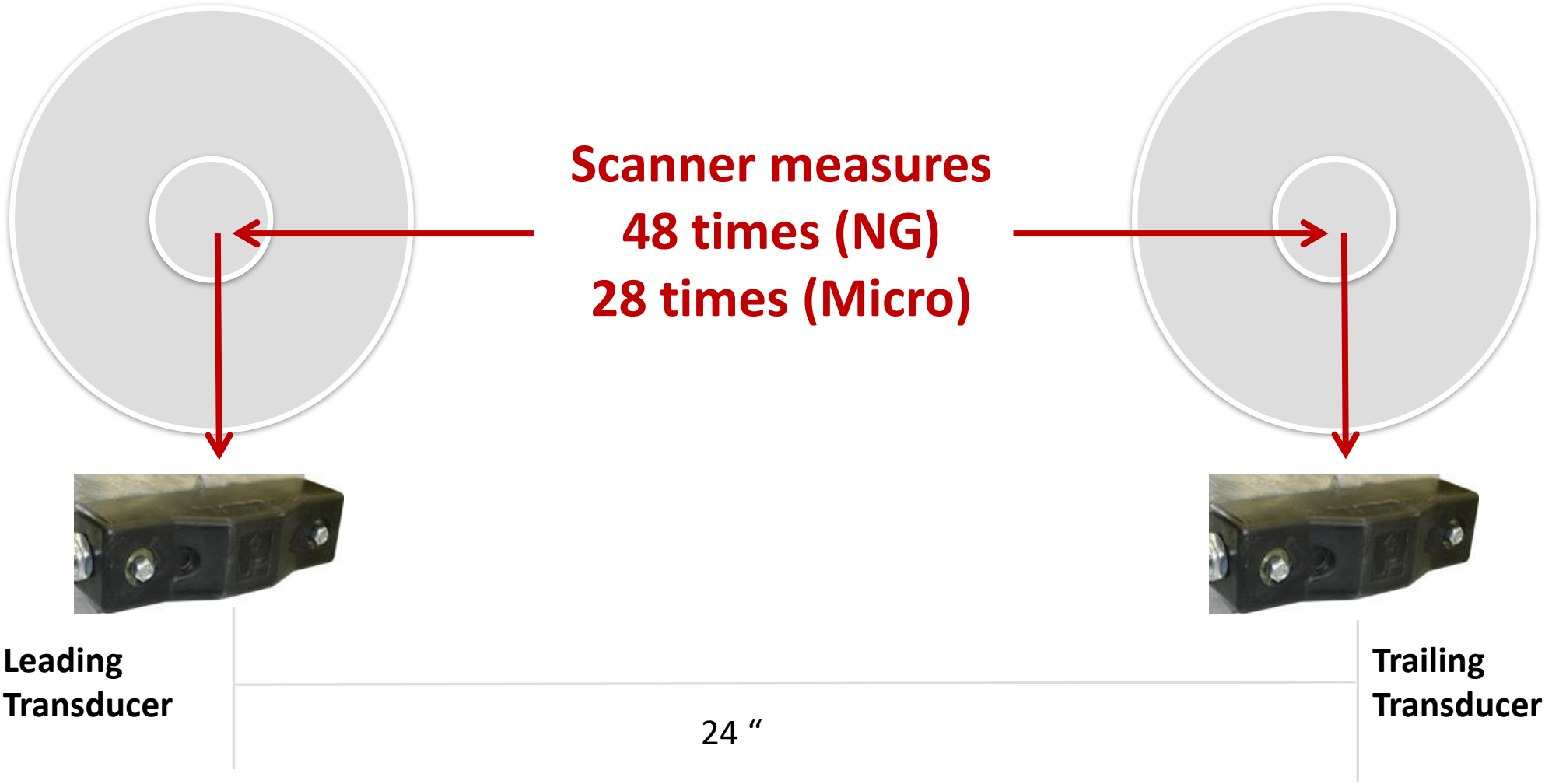


Leading Transducer

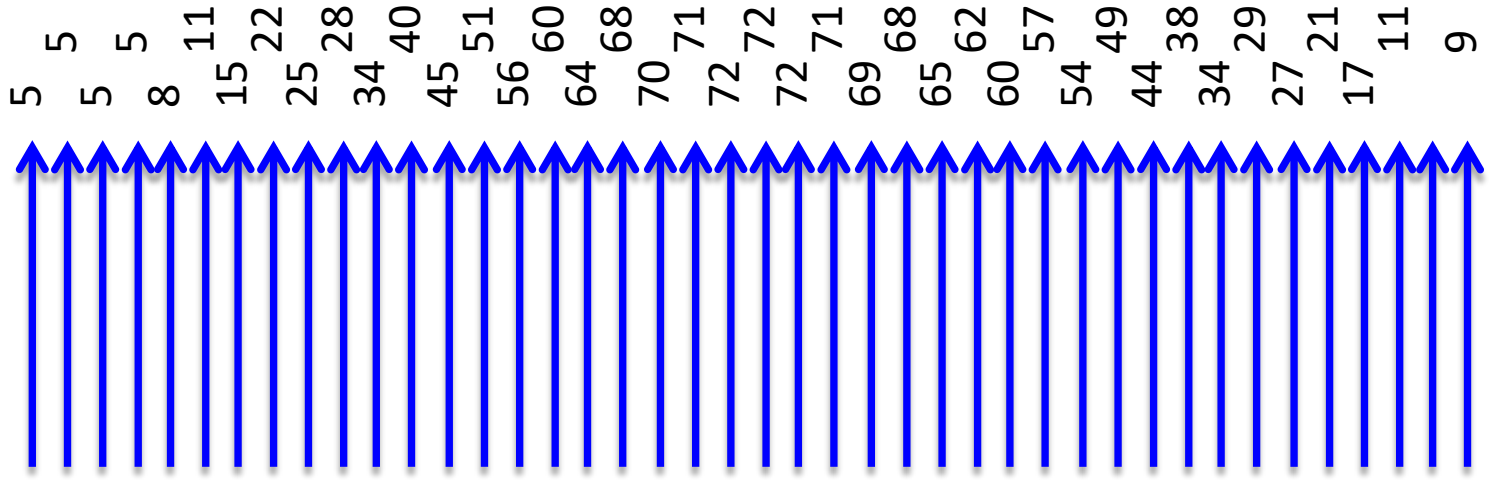
24 “

Trailing Transducer

Measuring Bearing Temperature 48 Times



NG Sample Temperature Measurements



Leading Transducer

24 “

Trailing Transducer

NG Scanner measures 48 times, once every ½ ”

NG Example 48 Measurements (Deg F)

5 5 5 5 8 11 15 21 25 28 34 40 45 51 56 60 64 68 70 71

72 72 72 72 71 69 68 65 62 60 57 54 49 44 38 34 29 27

21 17 12 11 9 8 7 7

Leading Transducer

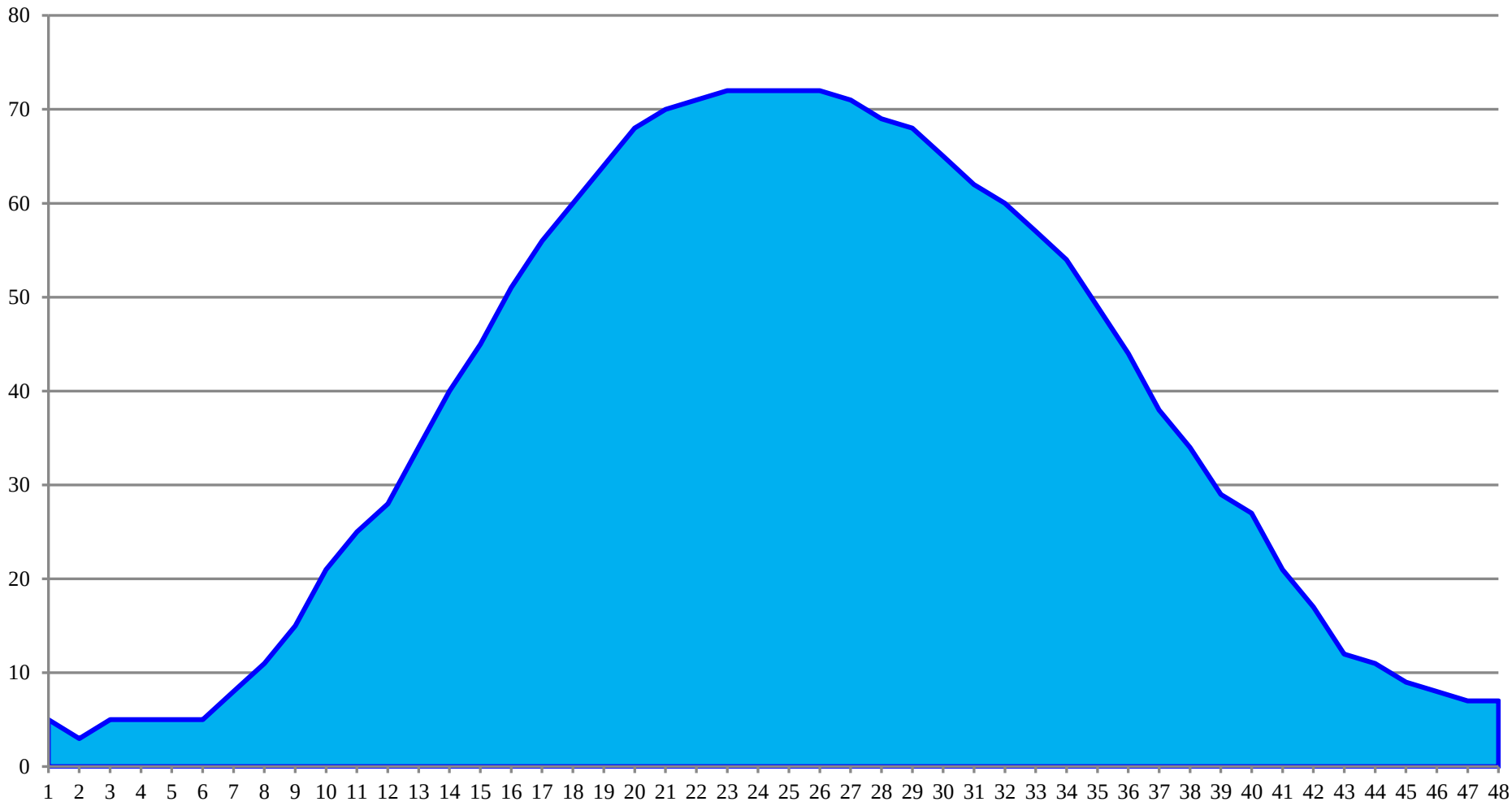
24 “

Trailing Transducer

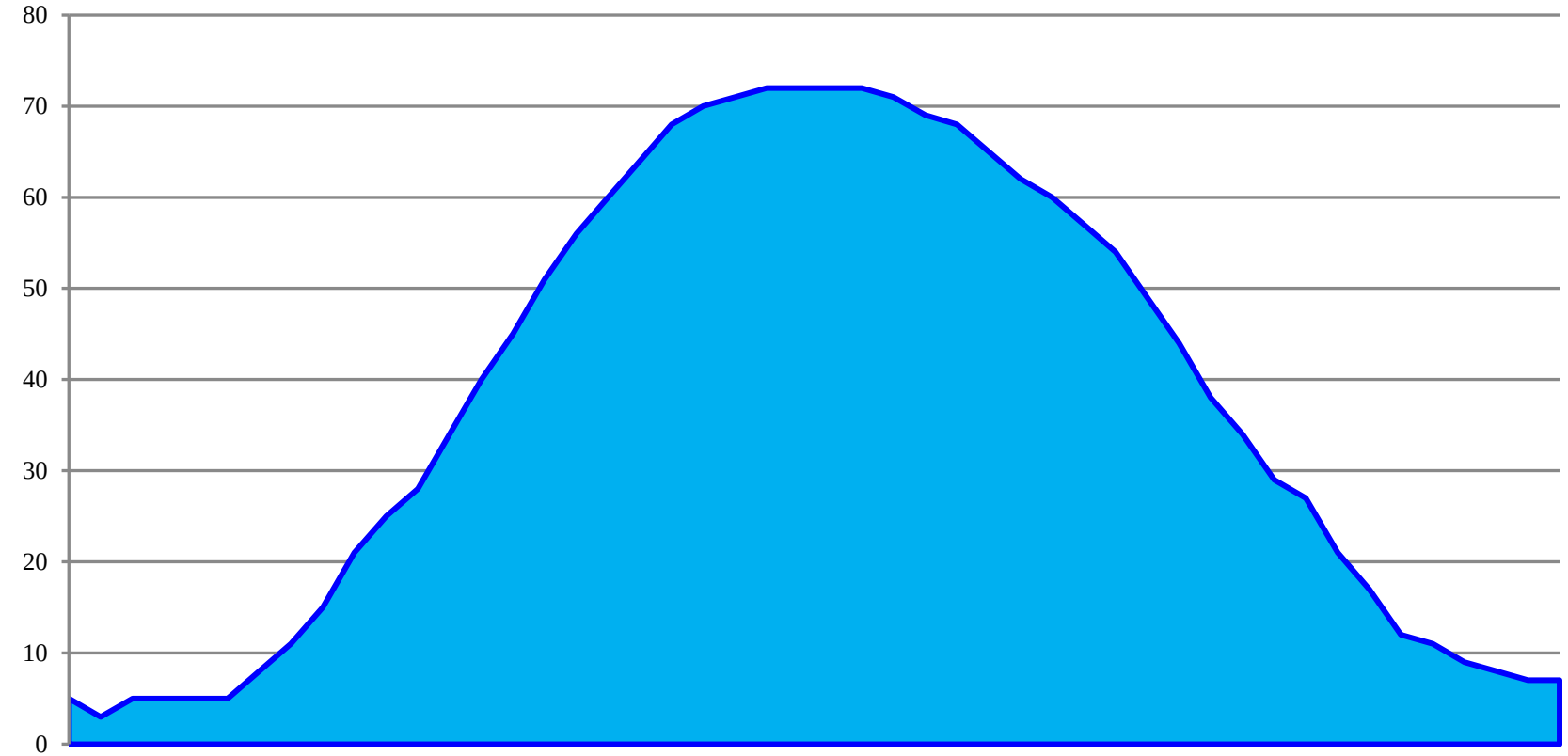
NG Scanner measures 48 times, once every ½ ”

Micro Scanner measure 28 times, once every 6/7”

NG Graph of 48 Measurements (Deg F)



NG 48 Measurements (Deg F)

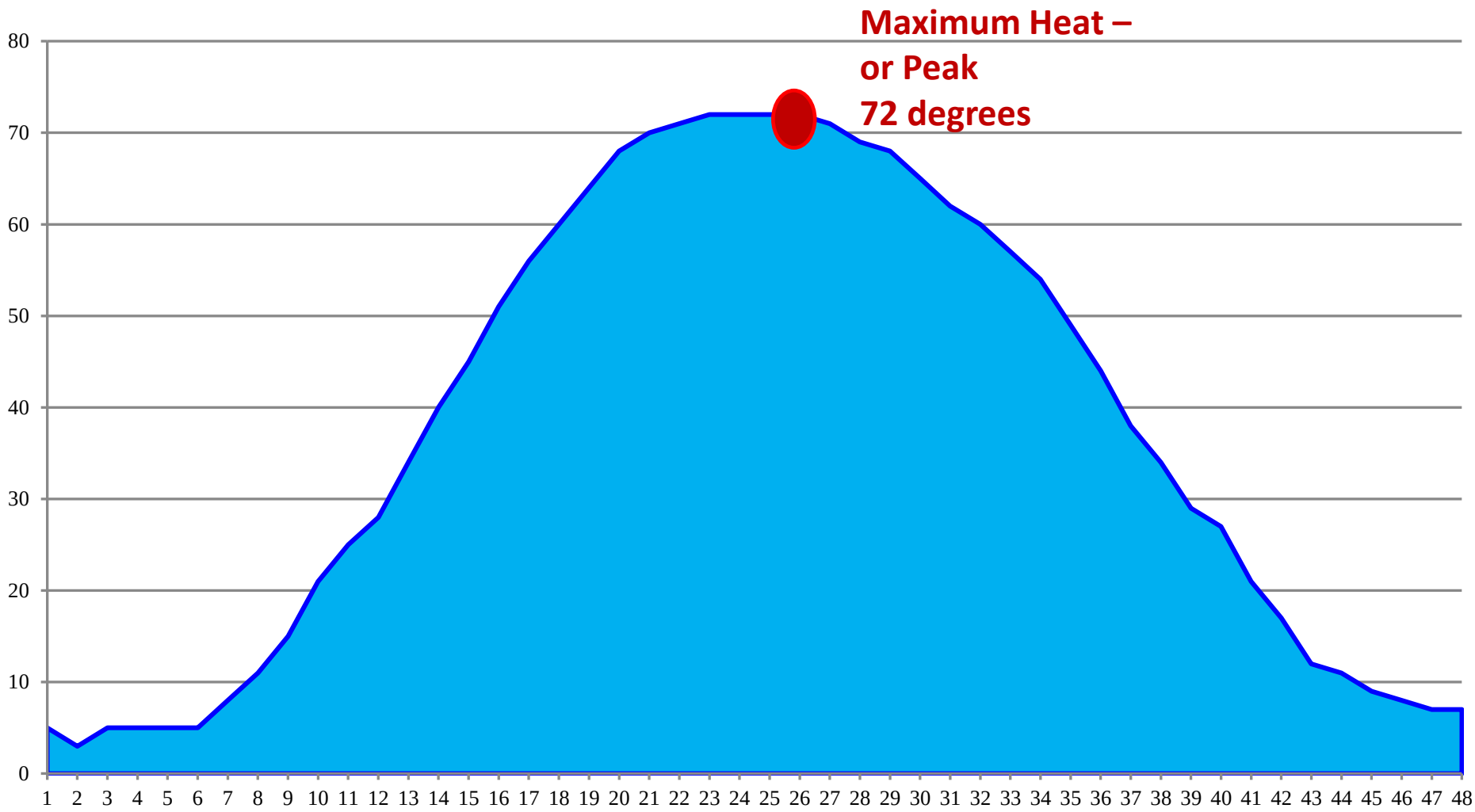


Leading Transducer

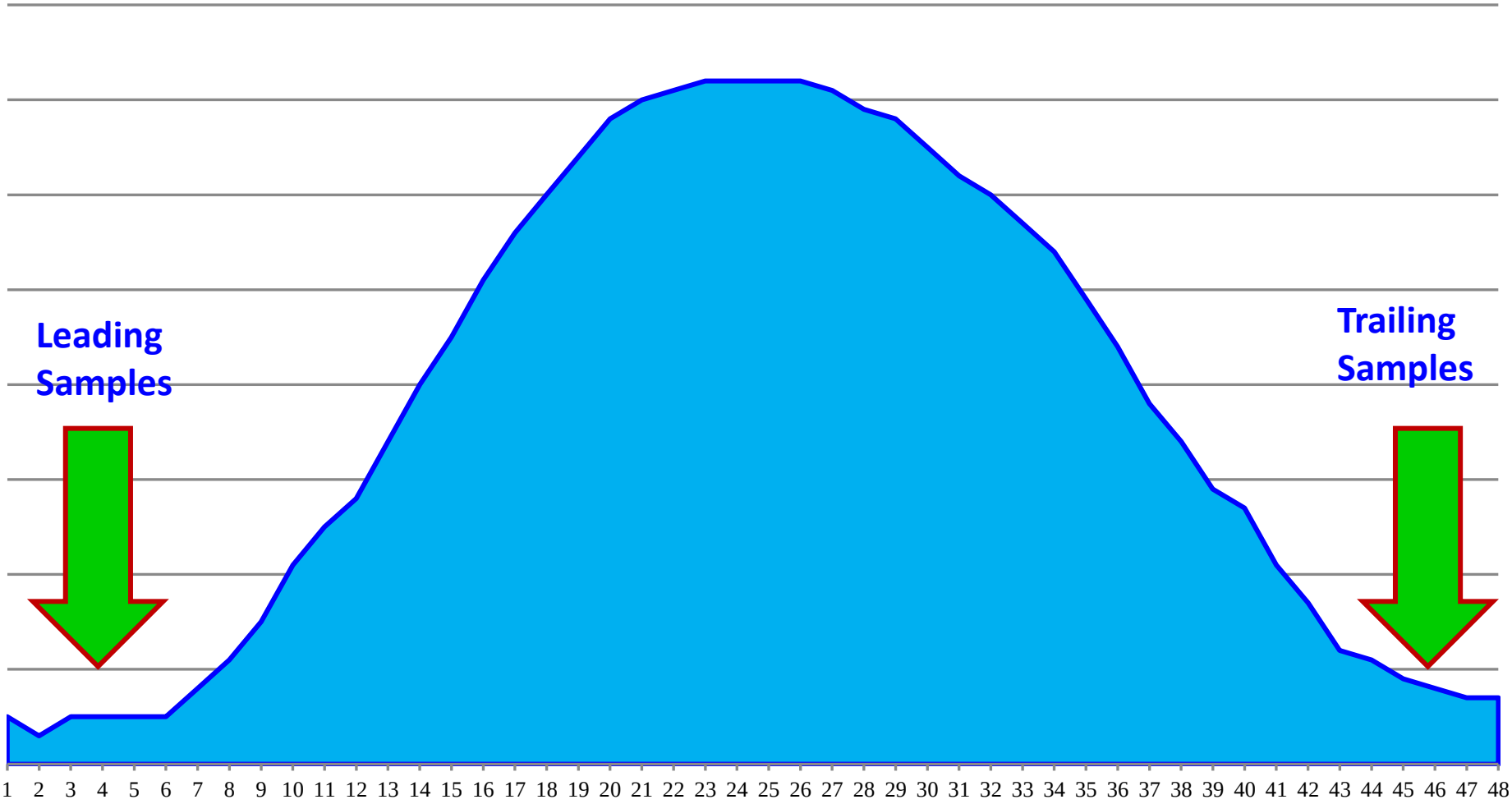
24 “

Trailing Transducer

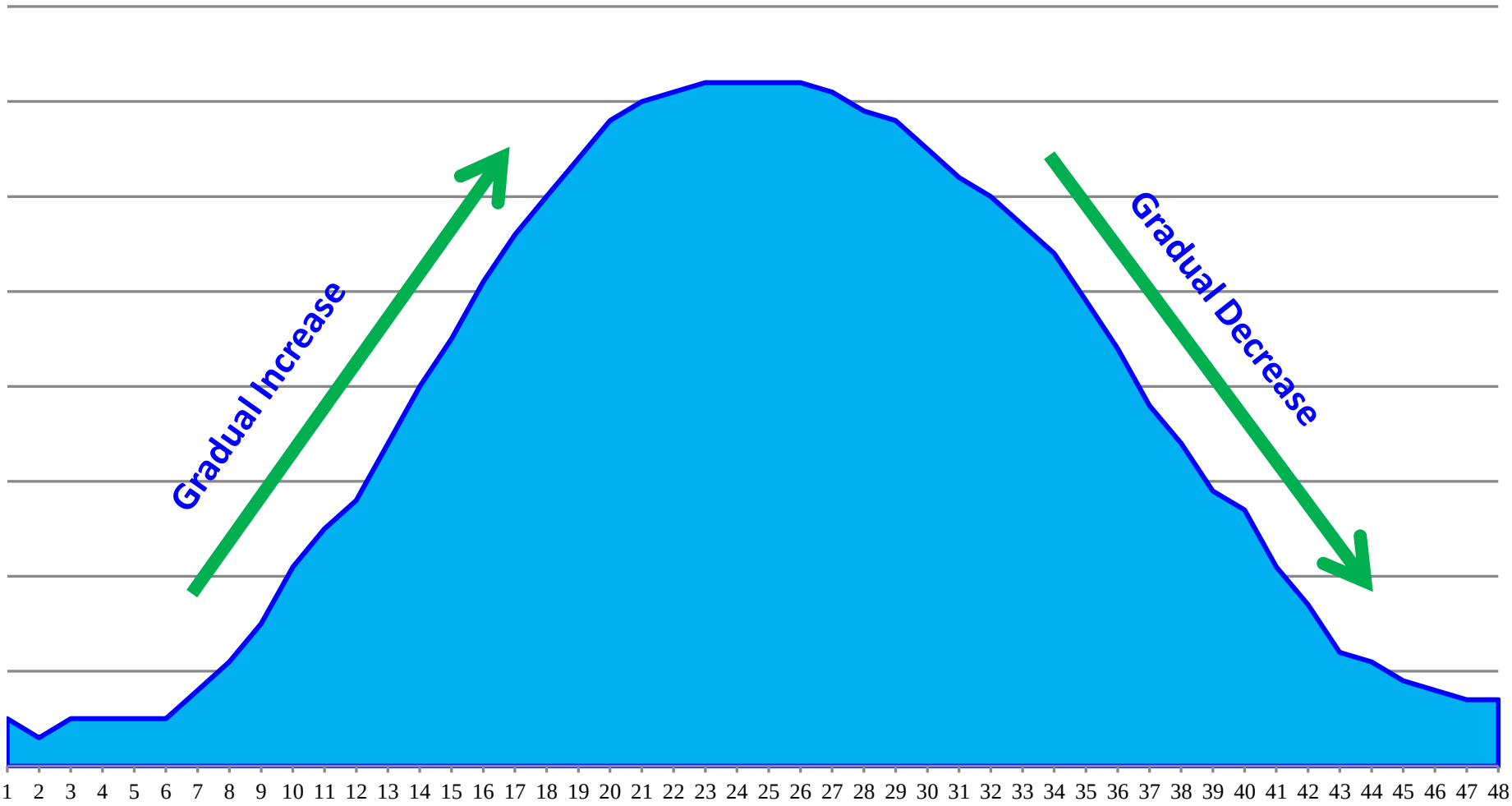
The Peak is Used for Alarm Analysis



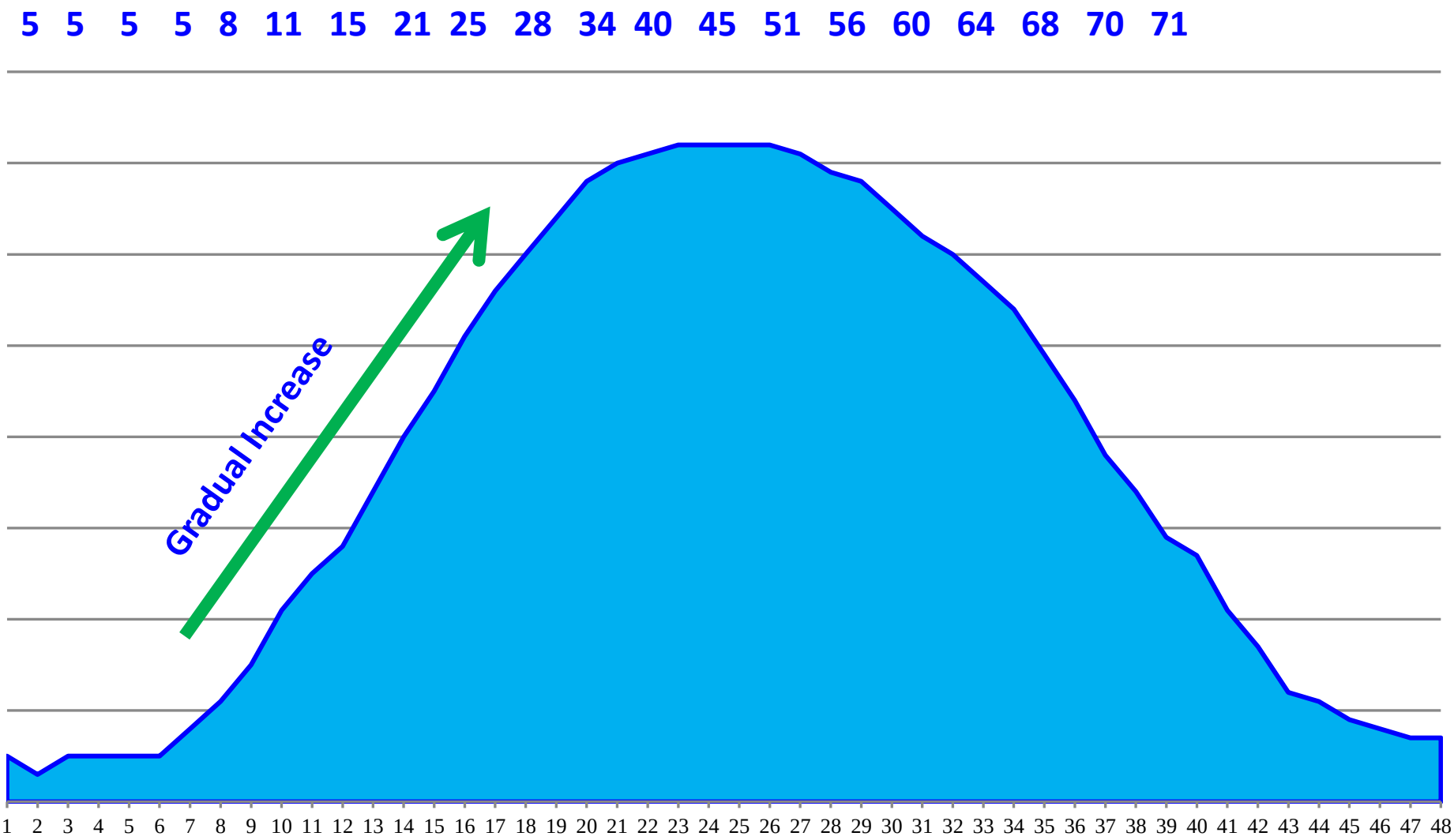
Correct DSR/Heat Profile Shape - 1



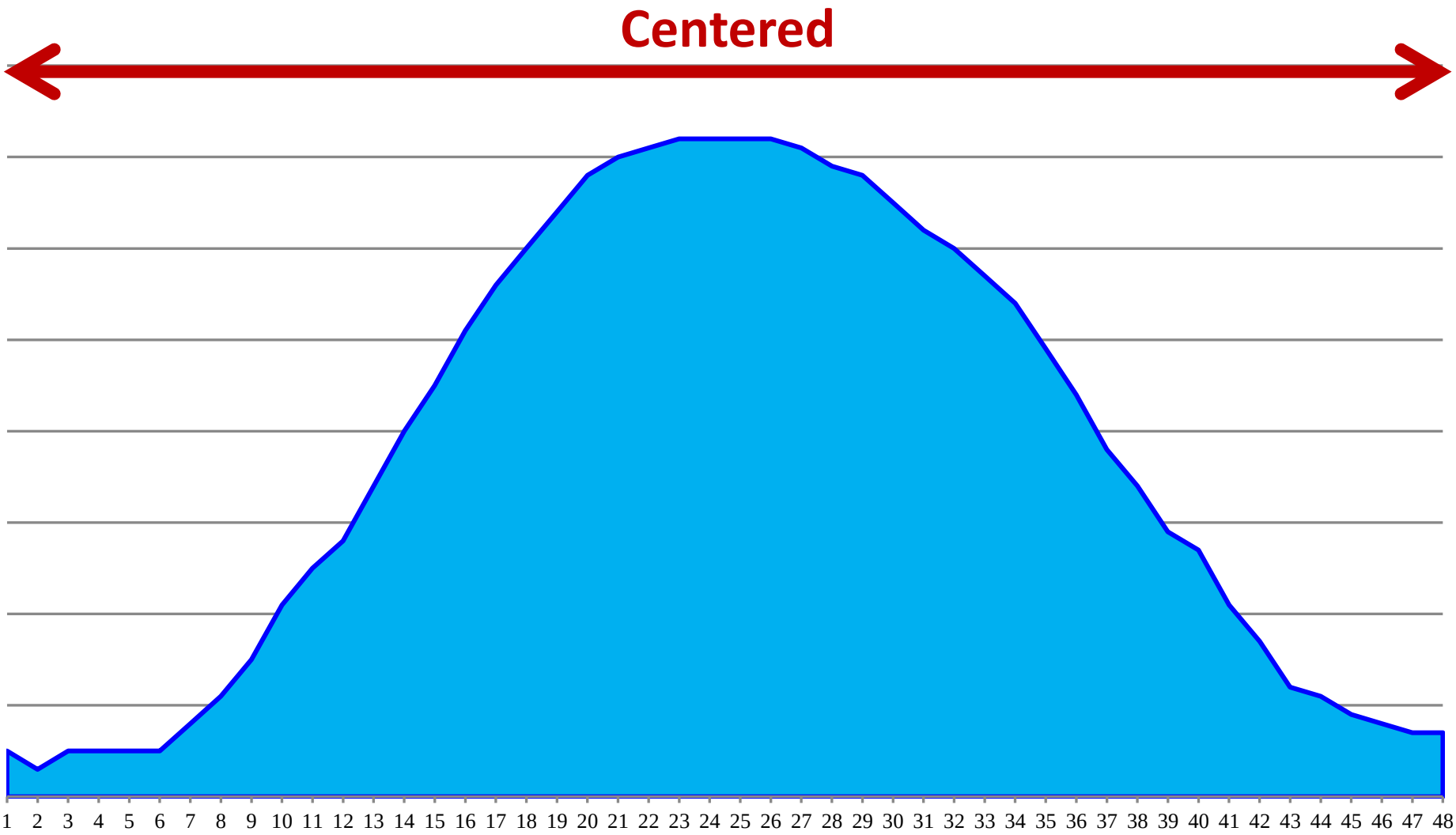
Correct DSR/Heat Profile Shape - 2



Correct DSR/Heat Profile Shape - 3



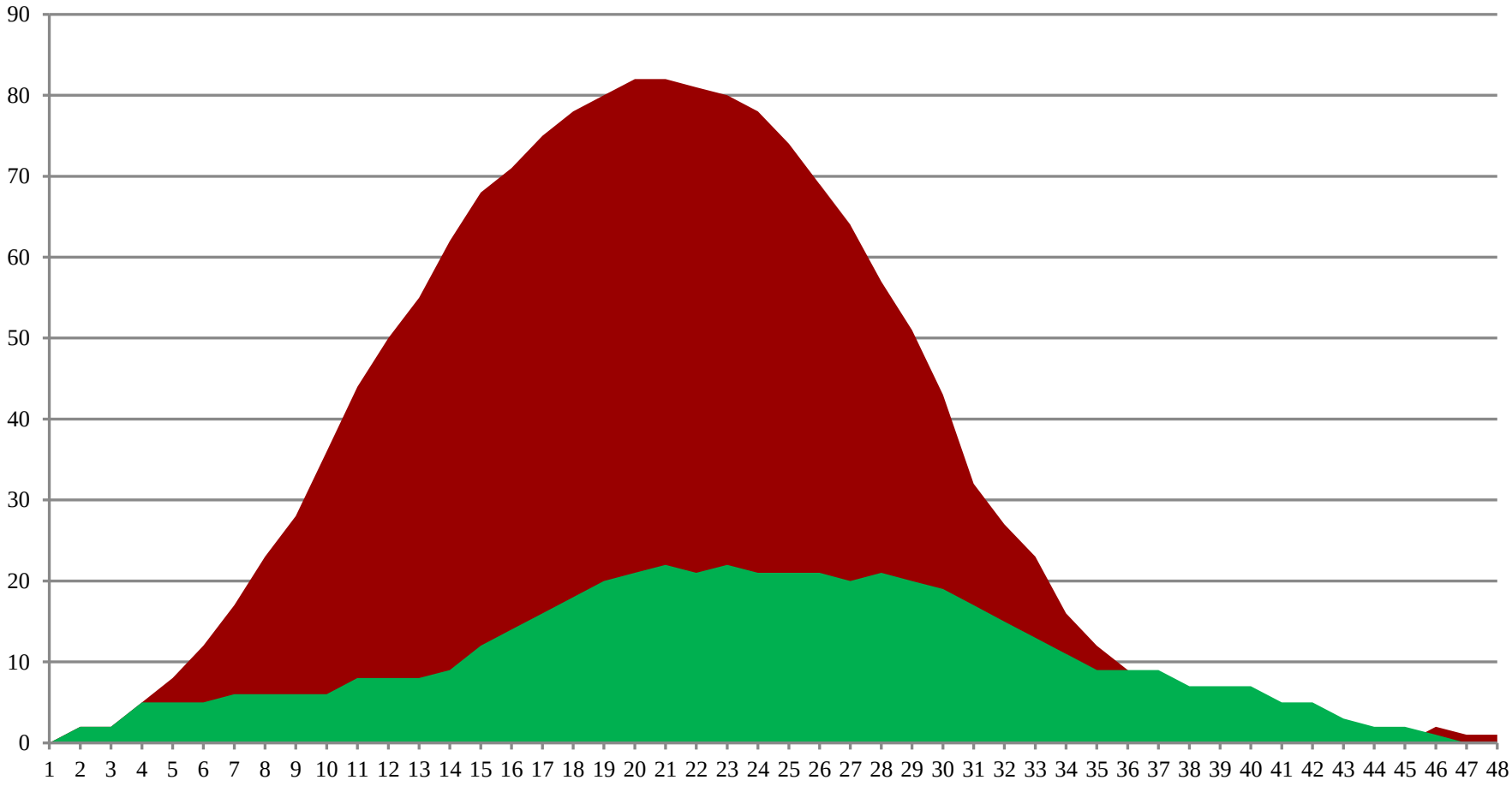
Correct DSR/Heat Profile Shape - 4



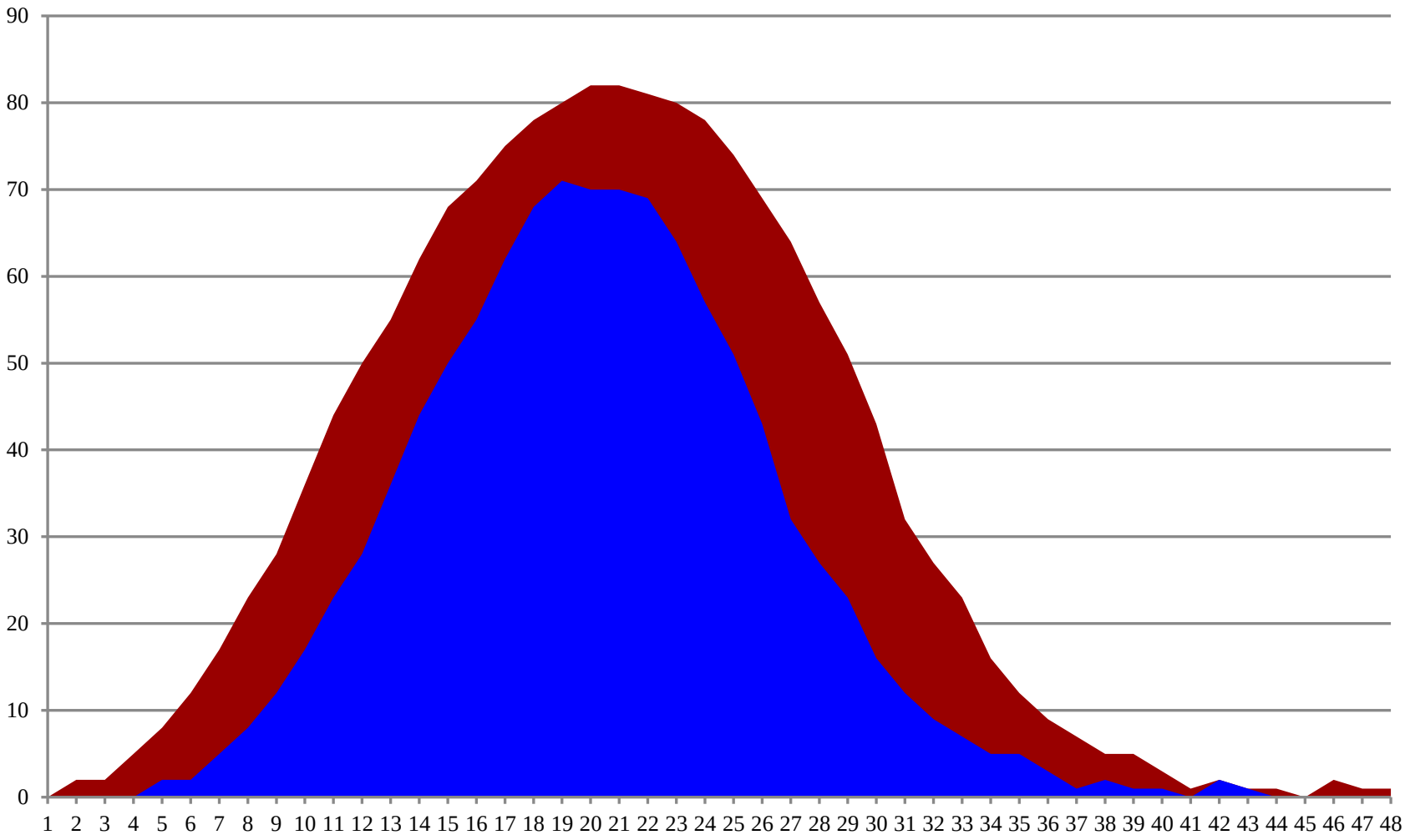
Learning from DSR/Heat Profiles

What does the shape tell us?

The Taller the DSR/Heat Profile, the Hotter the Bearing



The Width is a Function of Bearing Size



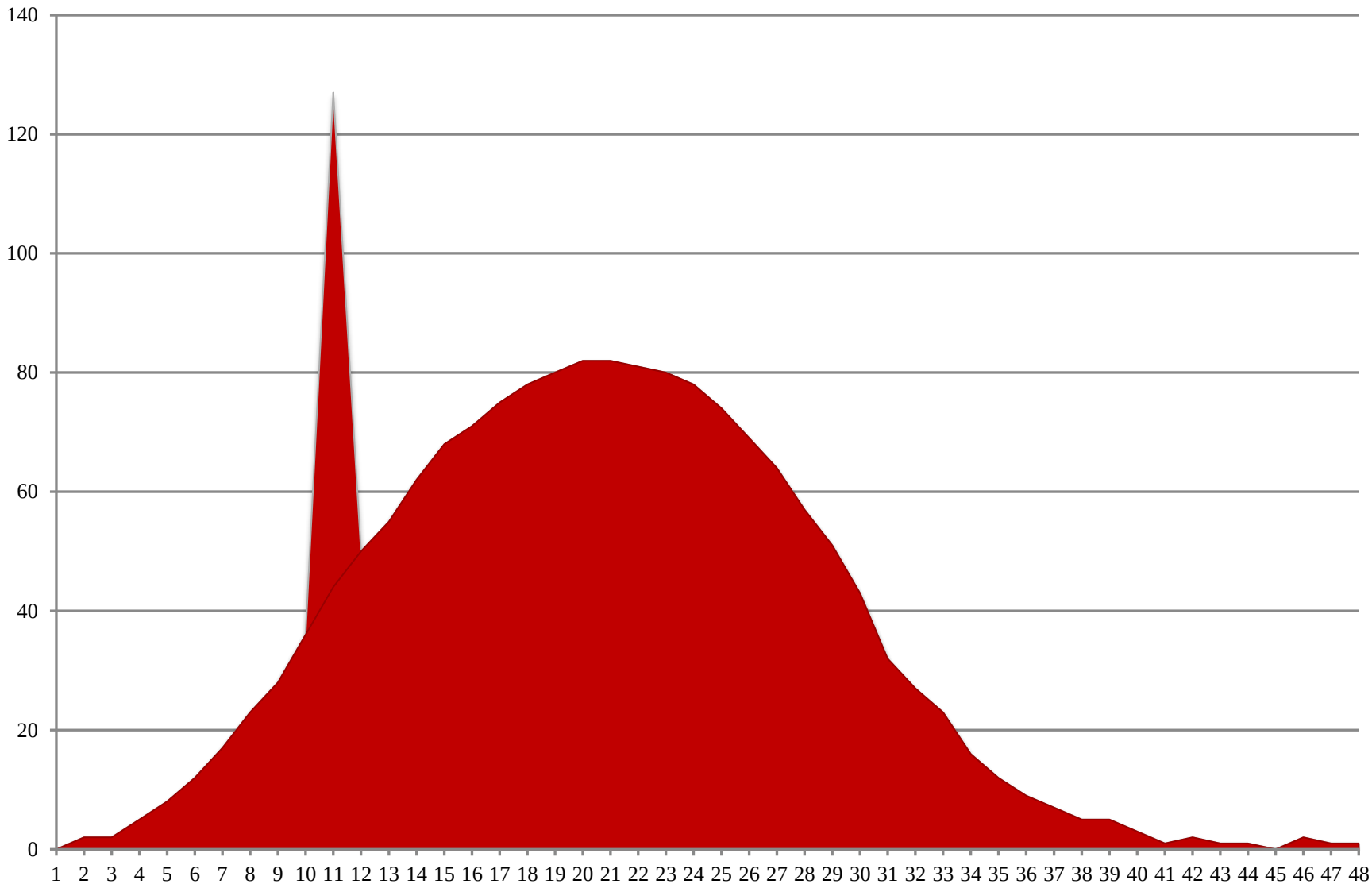
Learn from DSR/Heat Profile Shapes

Un-usual shape

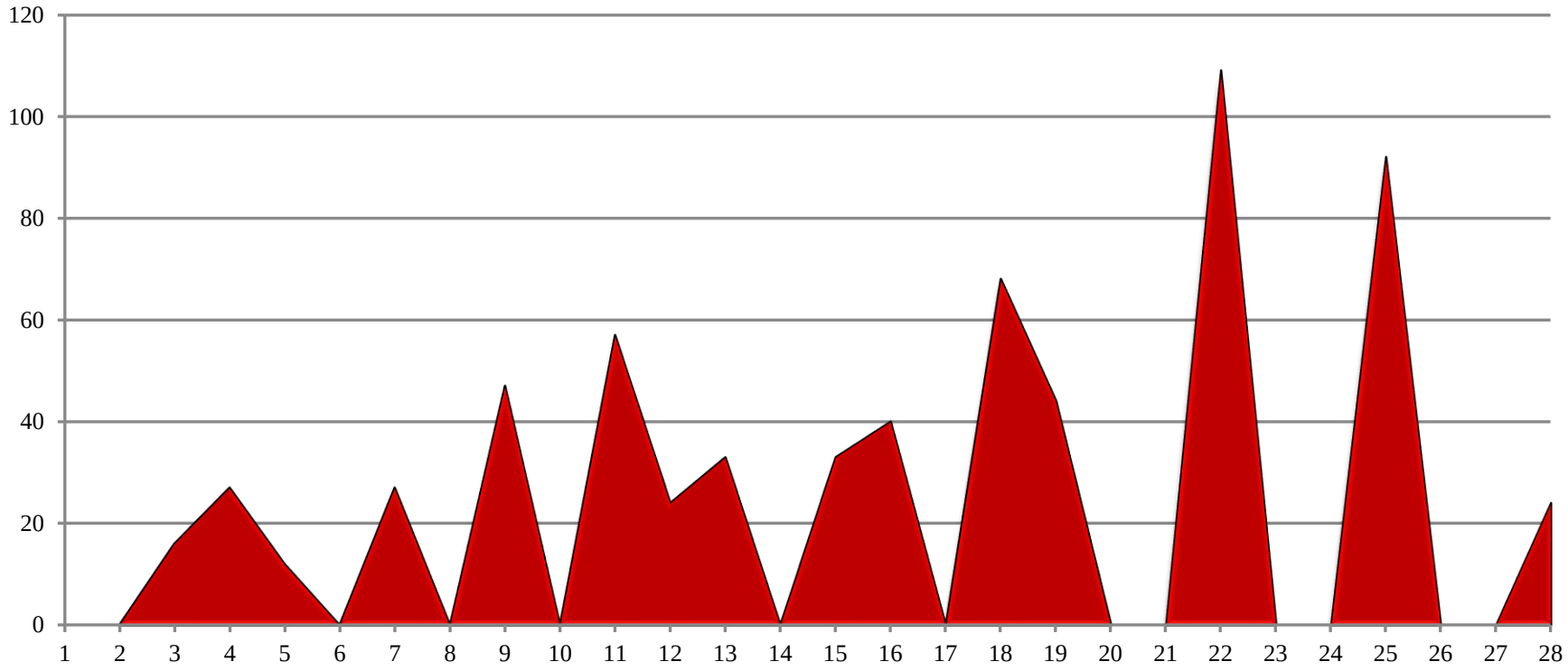
normally indicates

a problem in the field.

Noise, Flat Wheel, Noisy Pyro

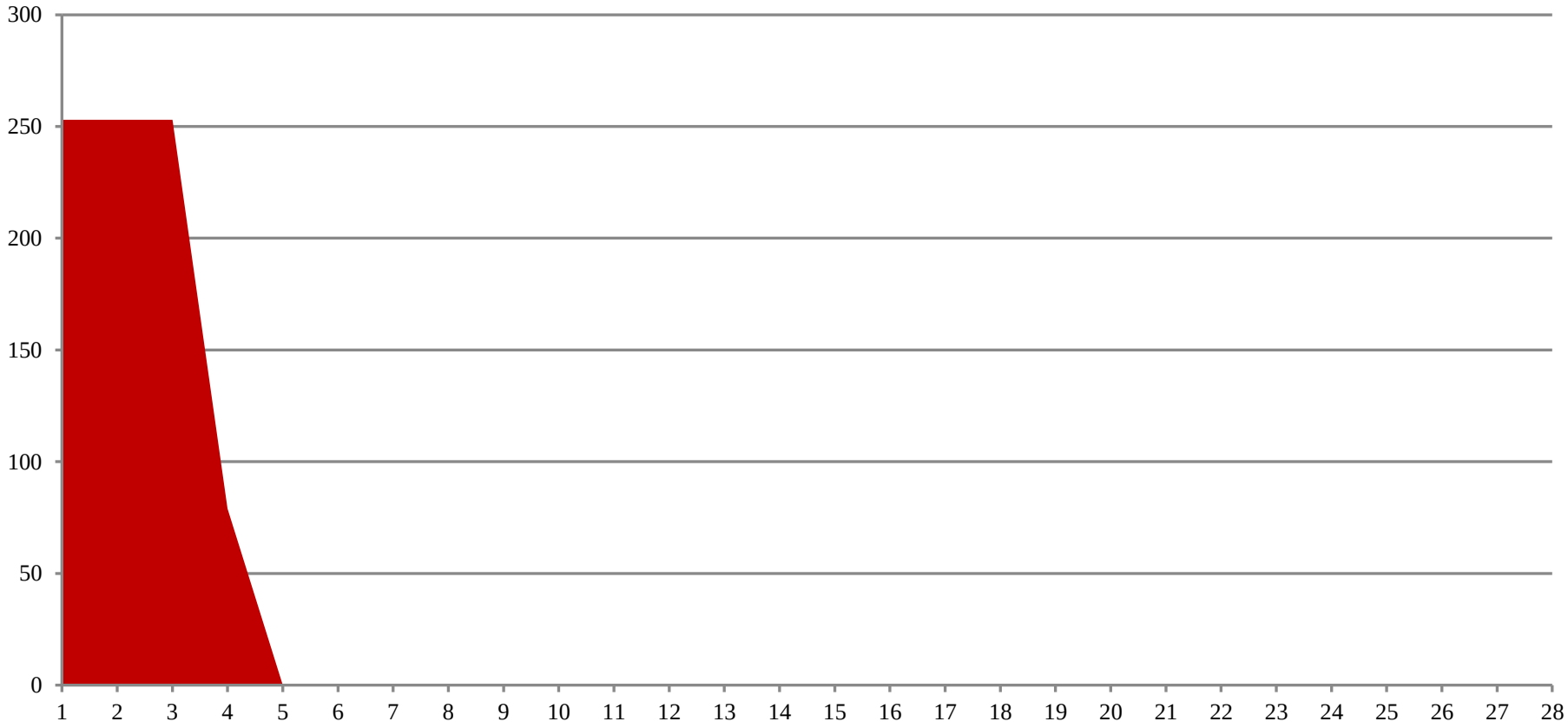


Loose Cable/Pyro, Short, Moisture

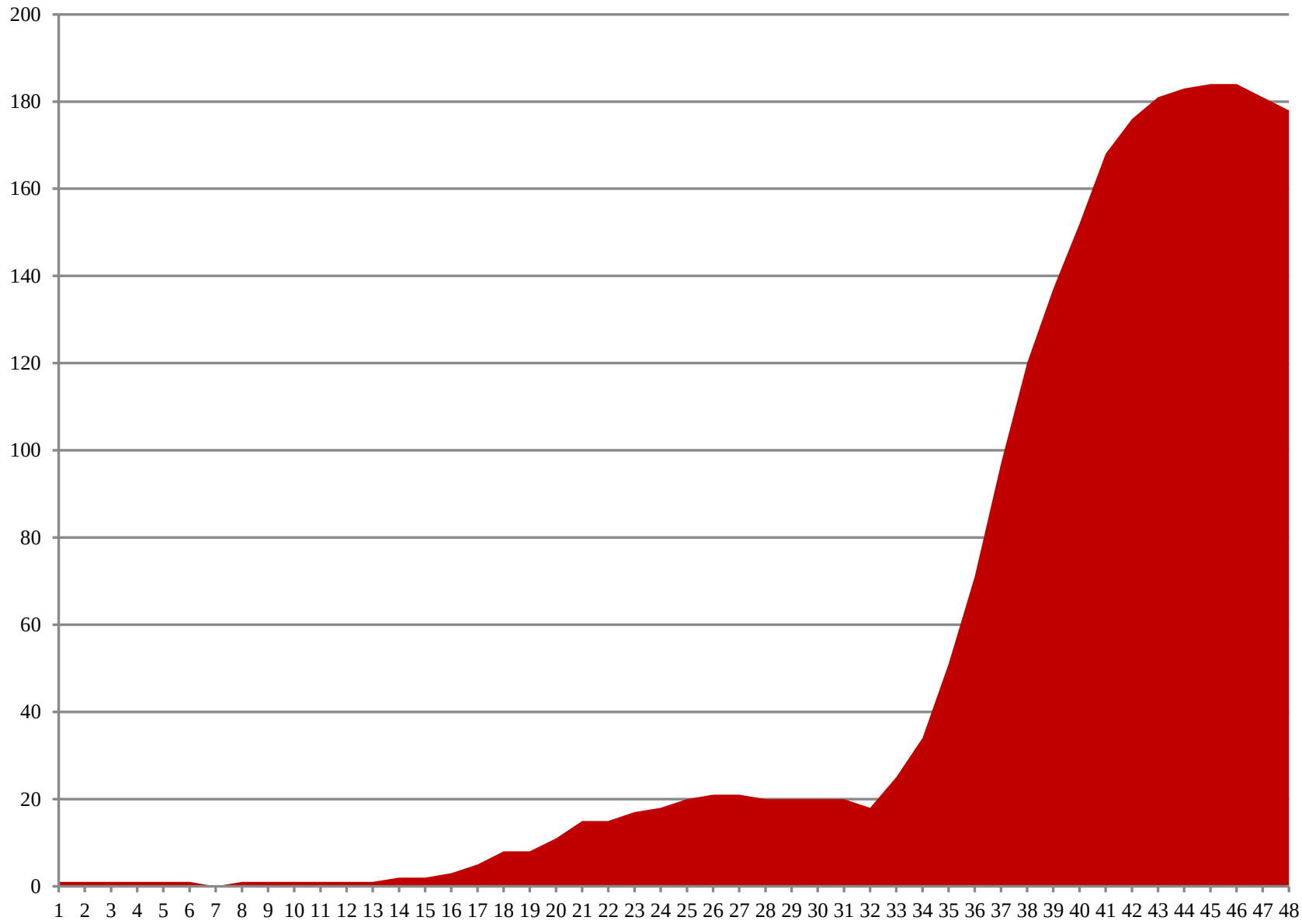


Sun-Shot

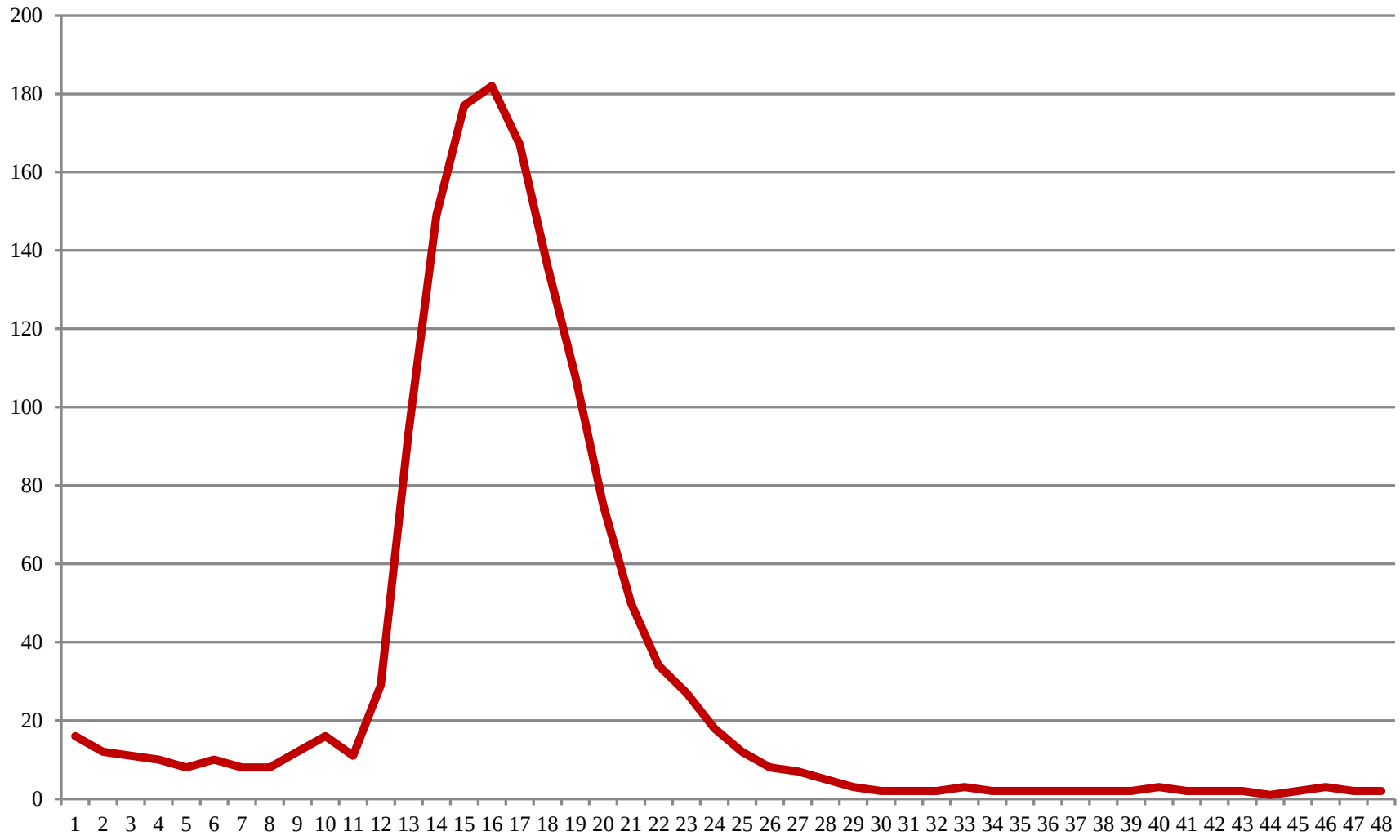
Lindale-2 May 7th, 10:30 a.m.



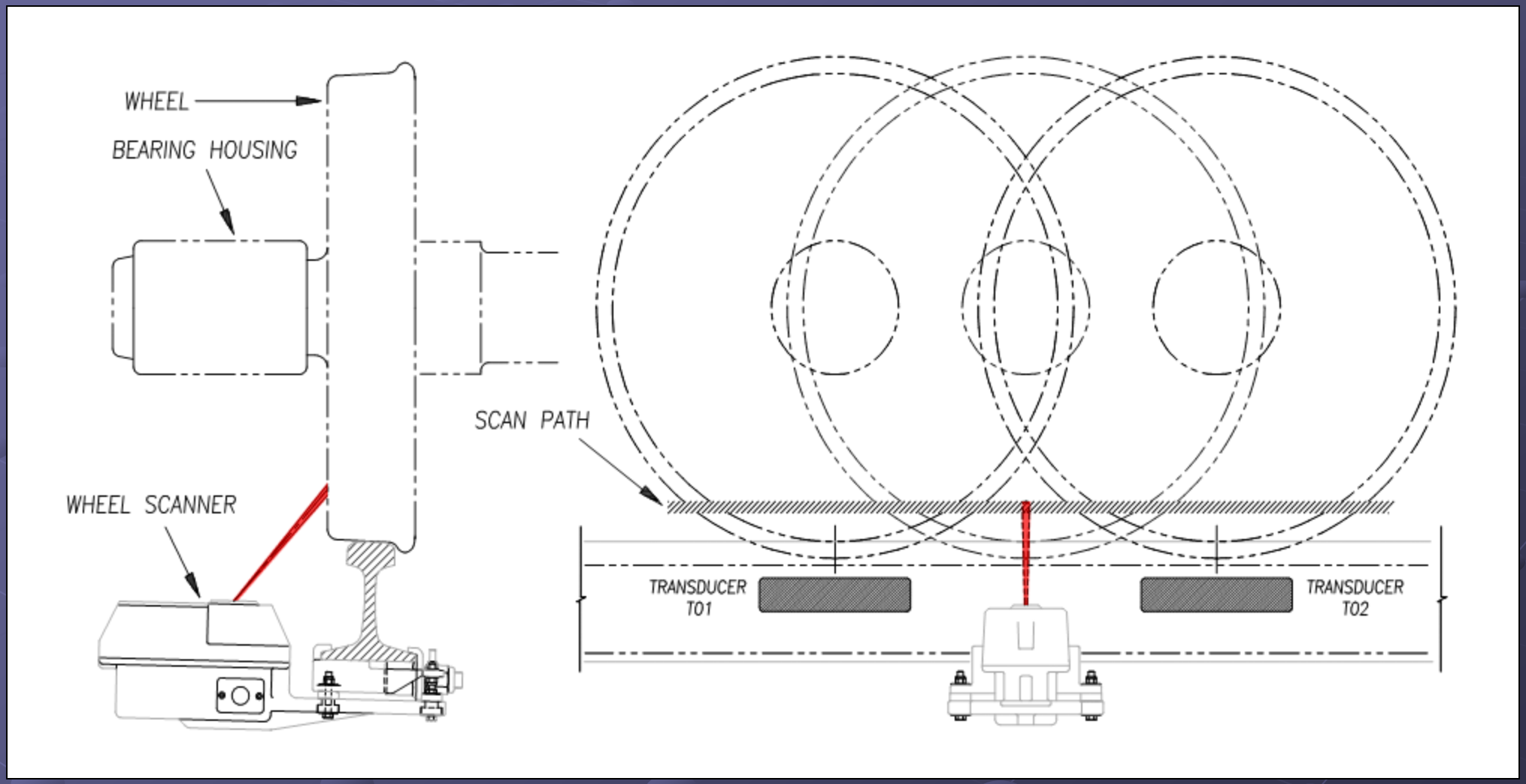
Sun Shot


200
180
160
140
120
100
80
60
40
20
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

Good DSR, Hot Bearing (ABS Alarm)

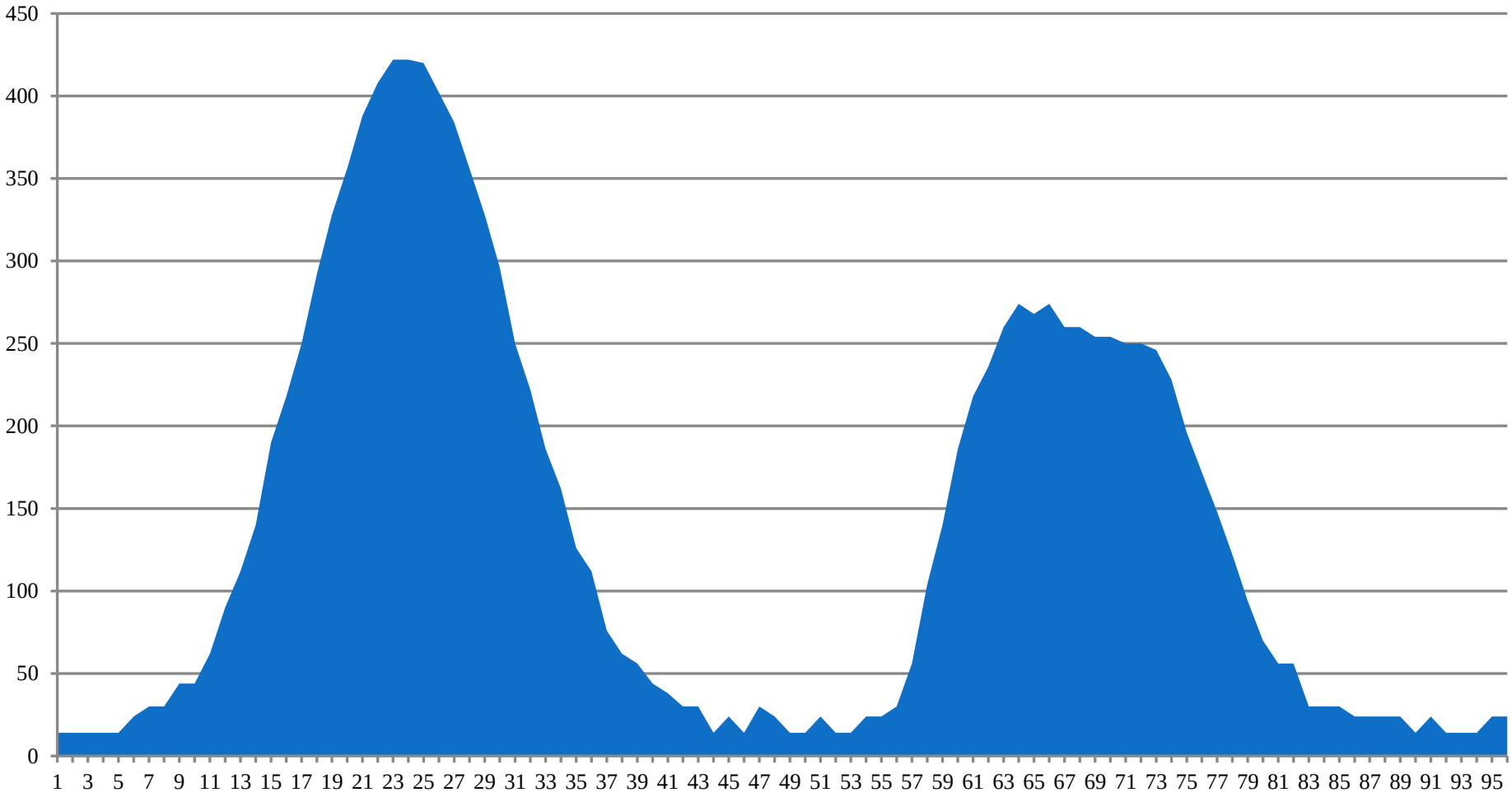


Wheel Scan Process



DSR/Heat Profiles Wheel Scanners

NG Wheel DSR – 96 Measurements



Bearing DSR - 48 Measurements (Deg F)

Direction of Travel

12“ (24 samples)

24 “ - 48 samples

12“ (24 samples)

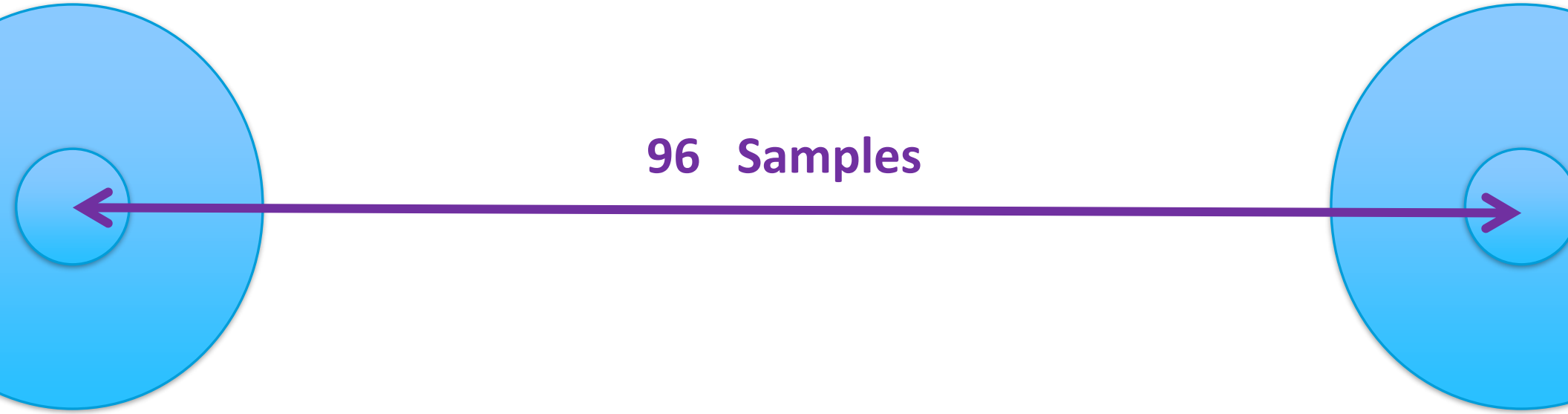
Bearing DSR - 48 Measurements (Deg F)

12“ (24 samples)

24 “ - 48 samples

12“ (24 samples)

NG Bearing DSR - 48 Measurements (Deg F)

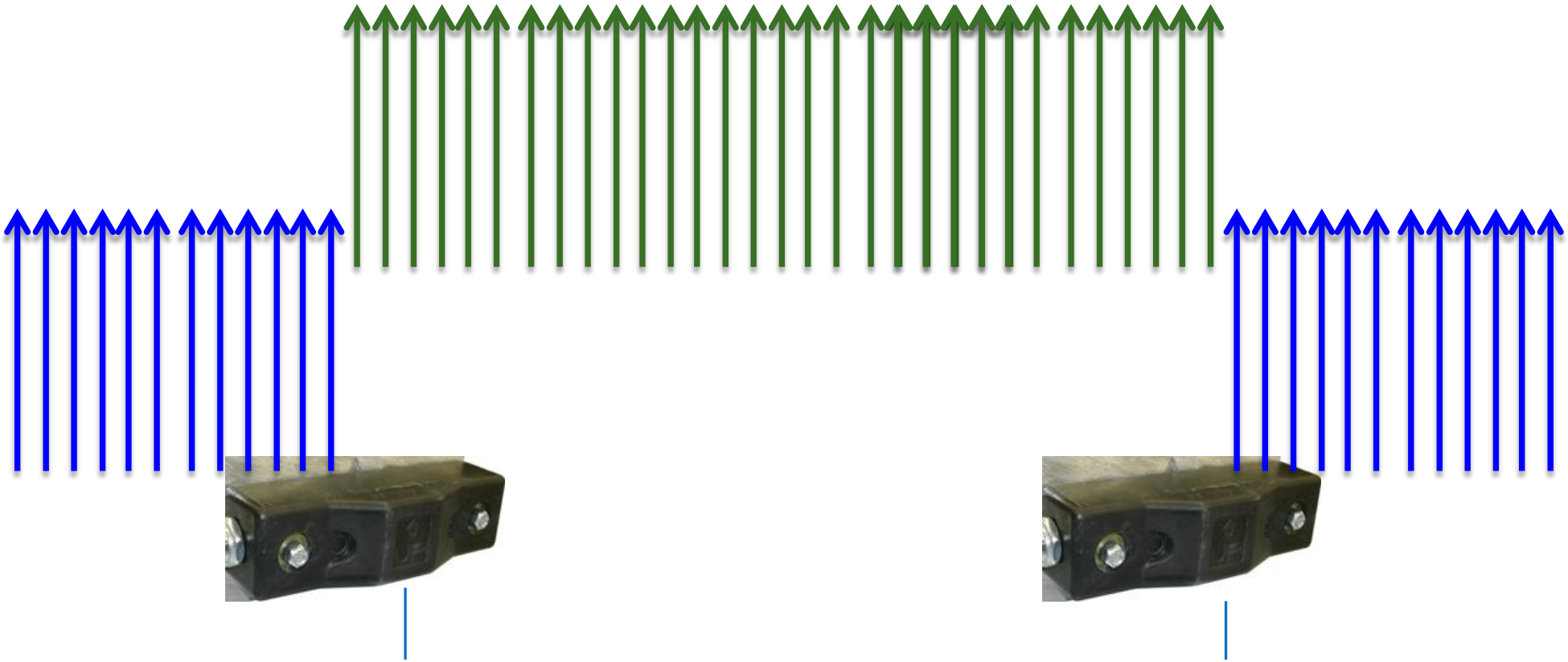


12“ (24 samples)

24 “

12“ (24 samples)

NG Bearing DSR - 48 Measurements (Deg F)

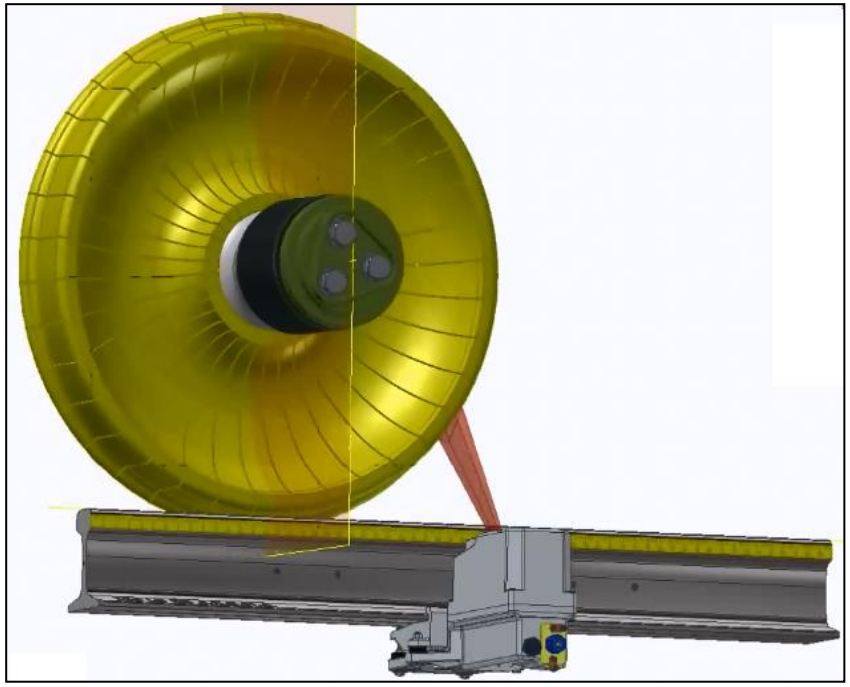


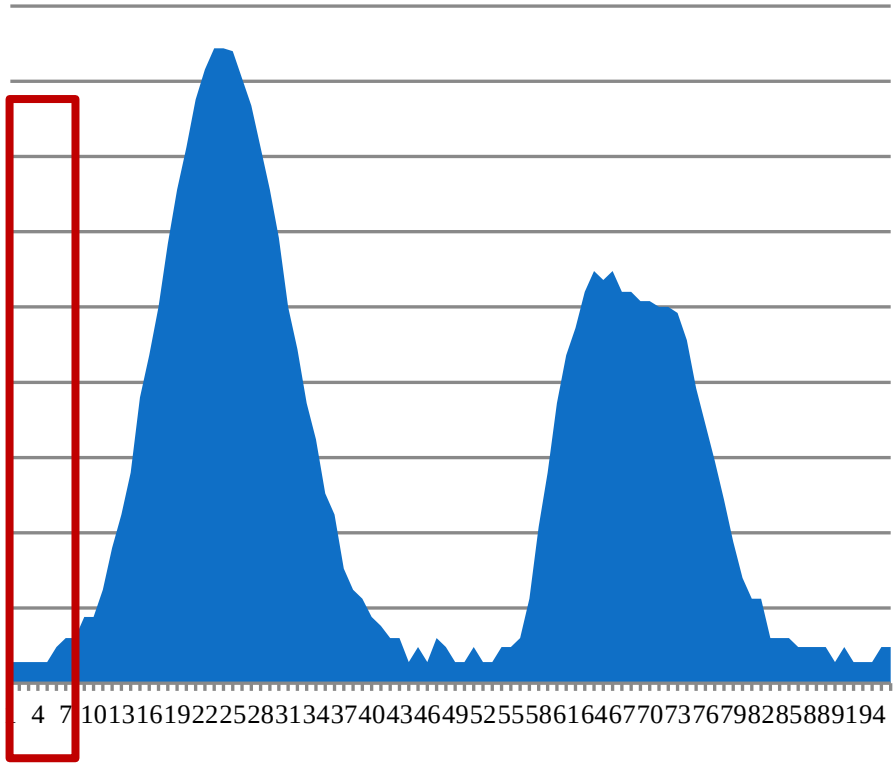
12“ (24 samples)

24 “ - 48 samples

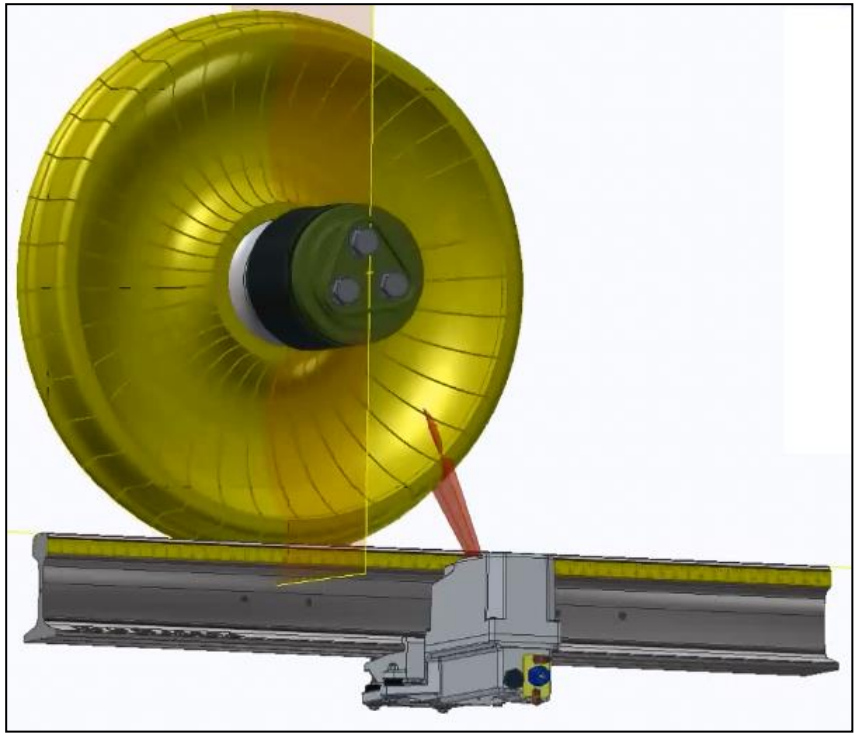
12“ (24 samples)

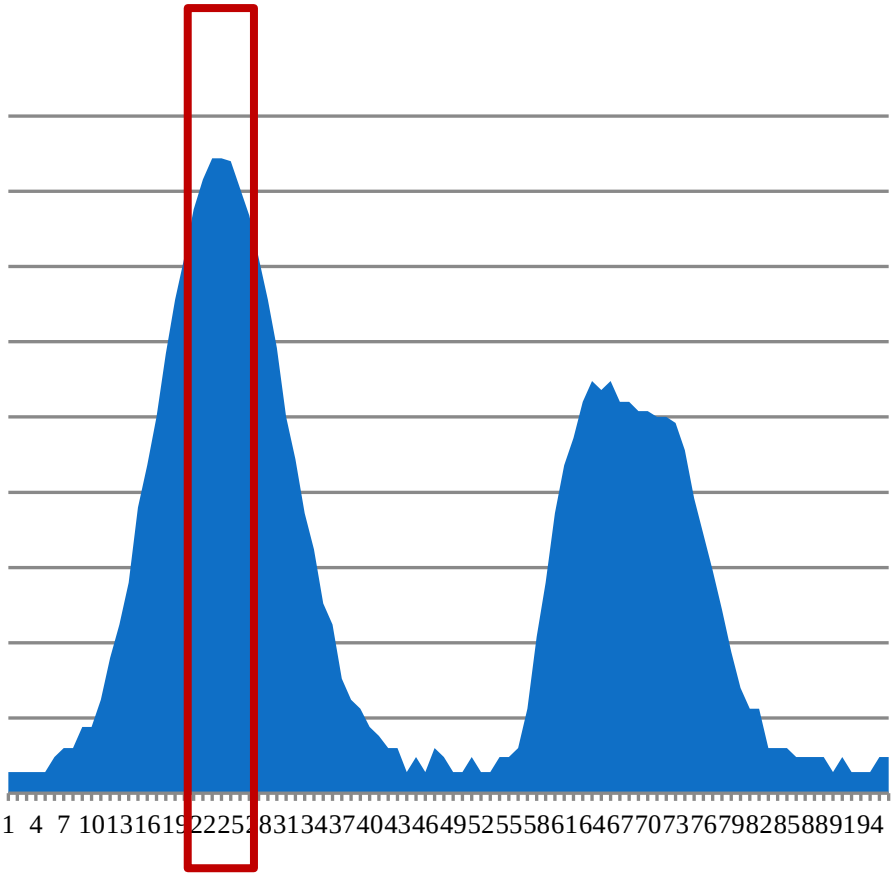
Before Flange/Rim/Tread



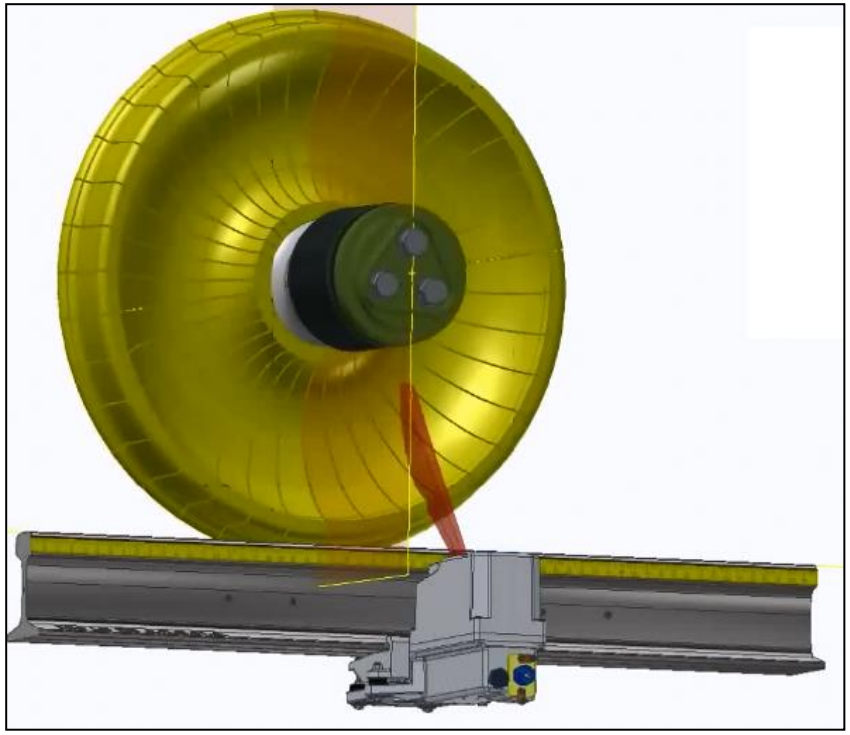


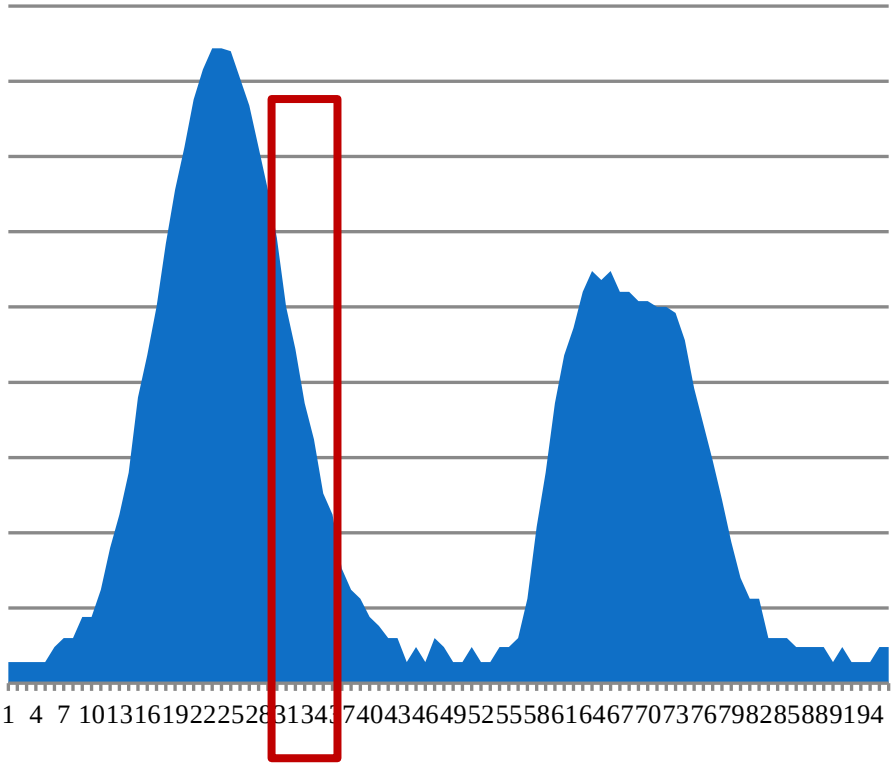
Leading Flange/Rim/Tread



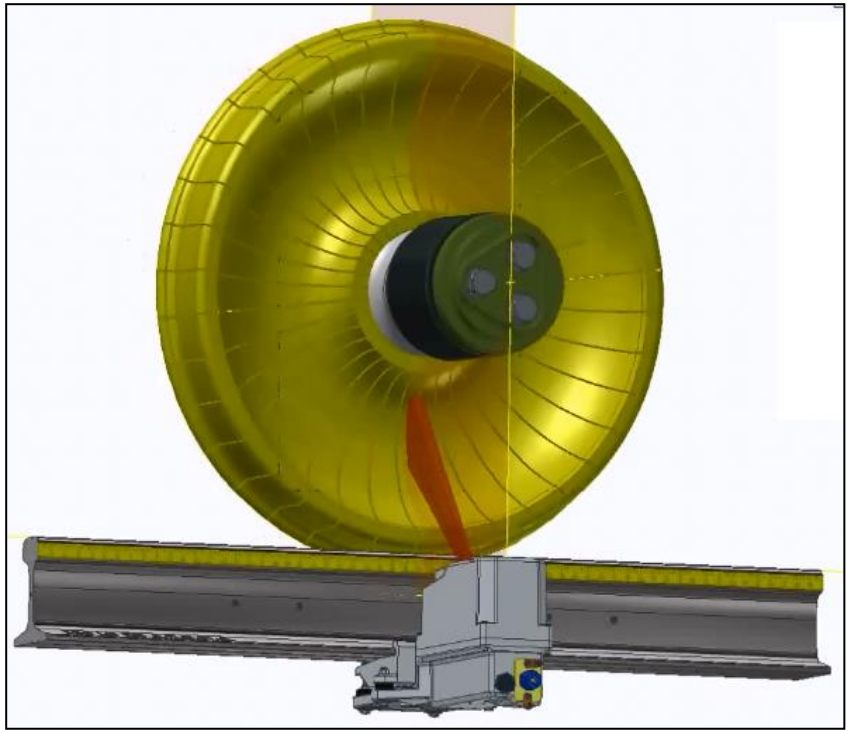


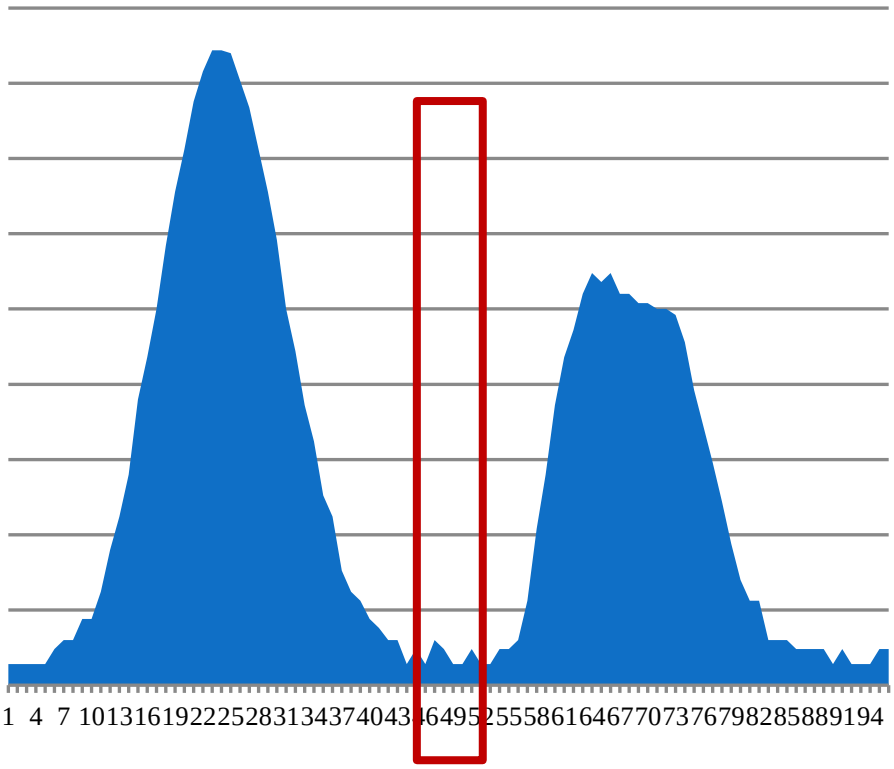
Plate



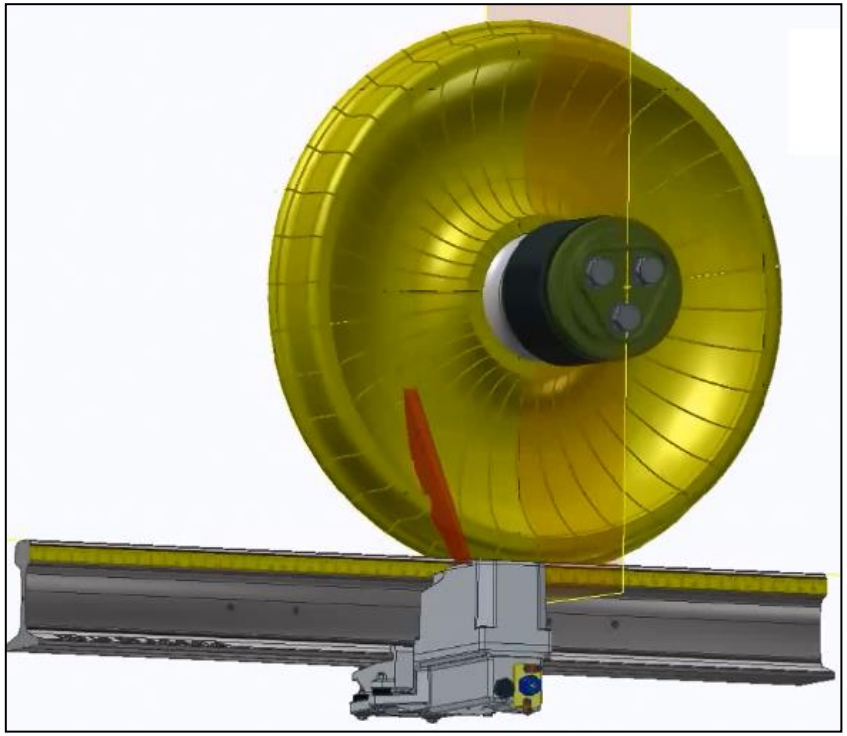


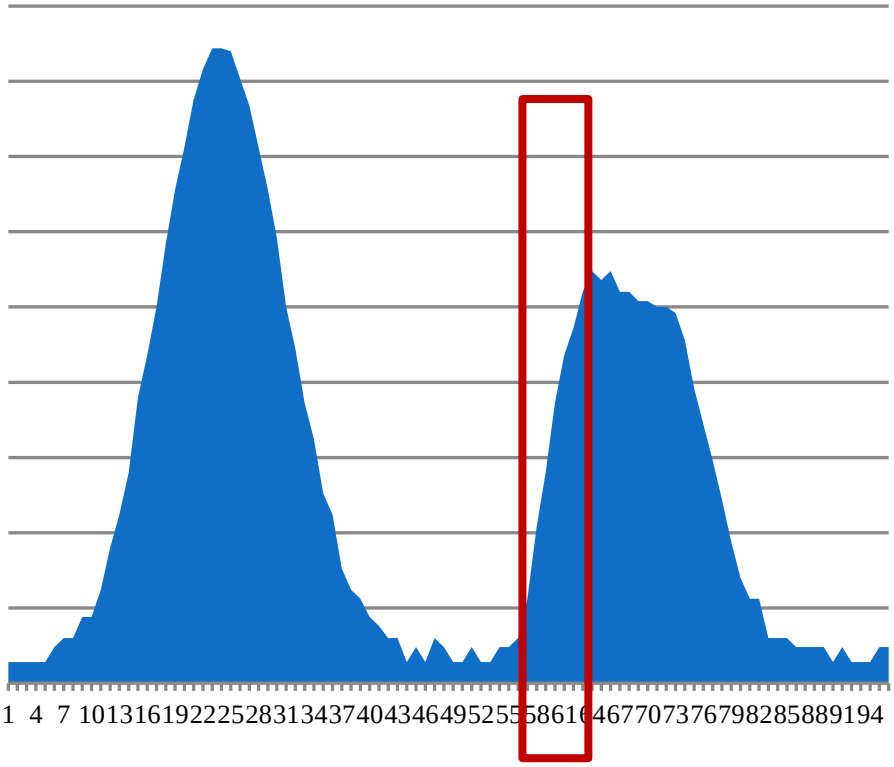
Middle of Plate



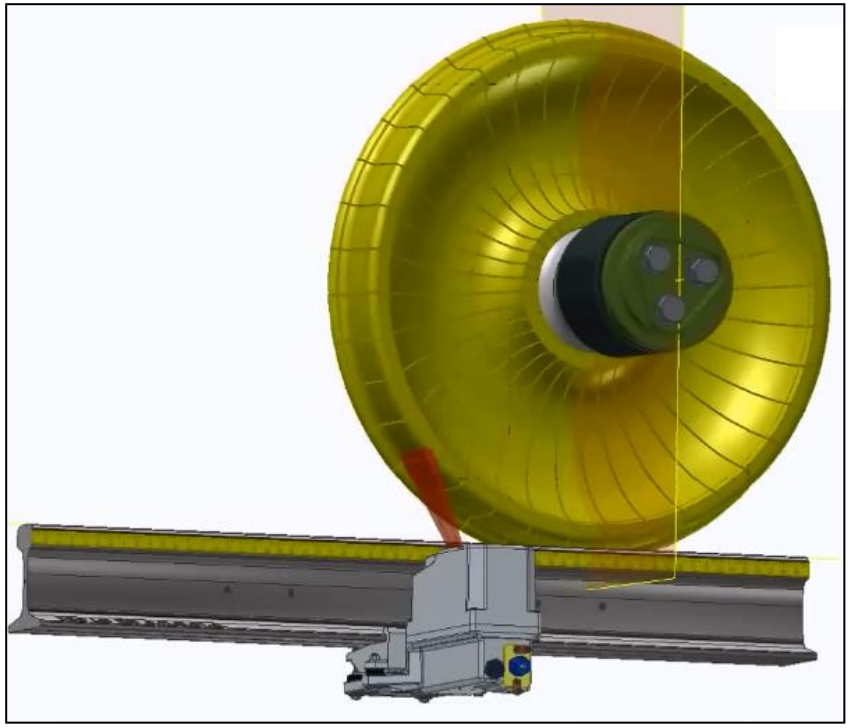


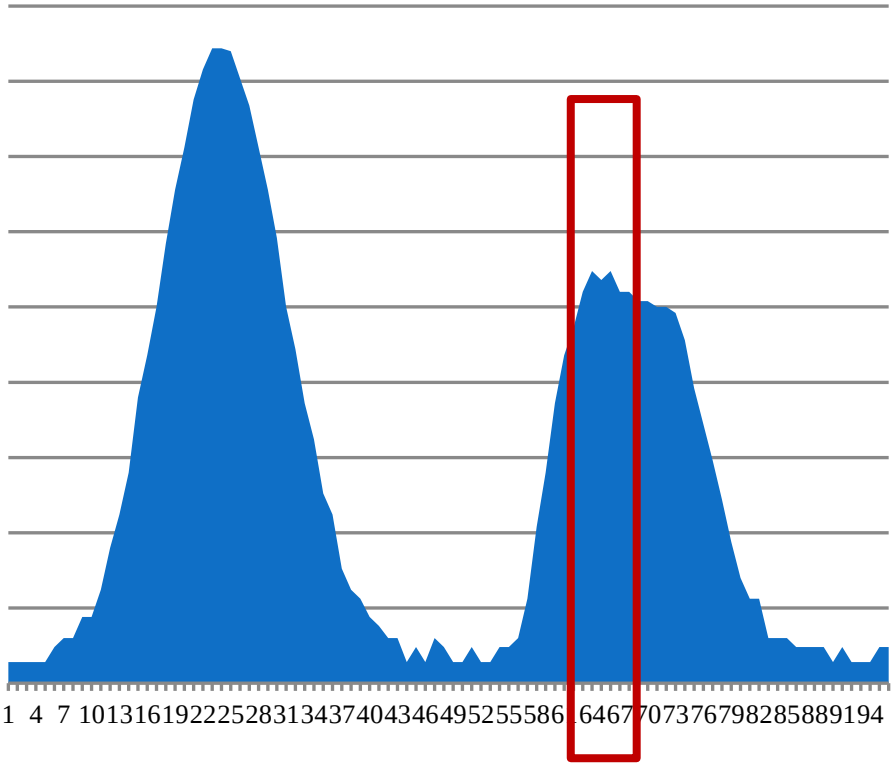
Near Trailing Rim



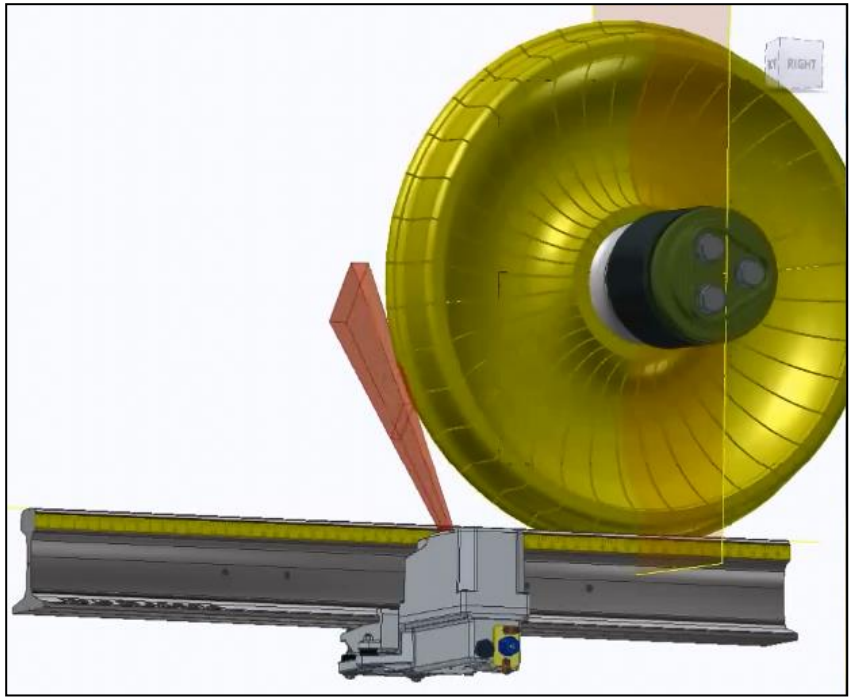


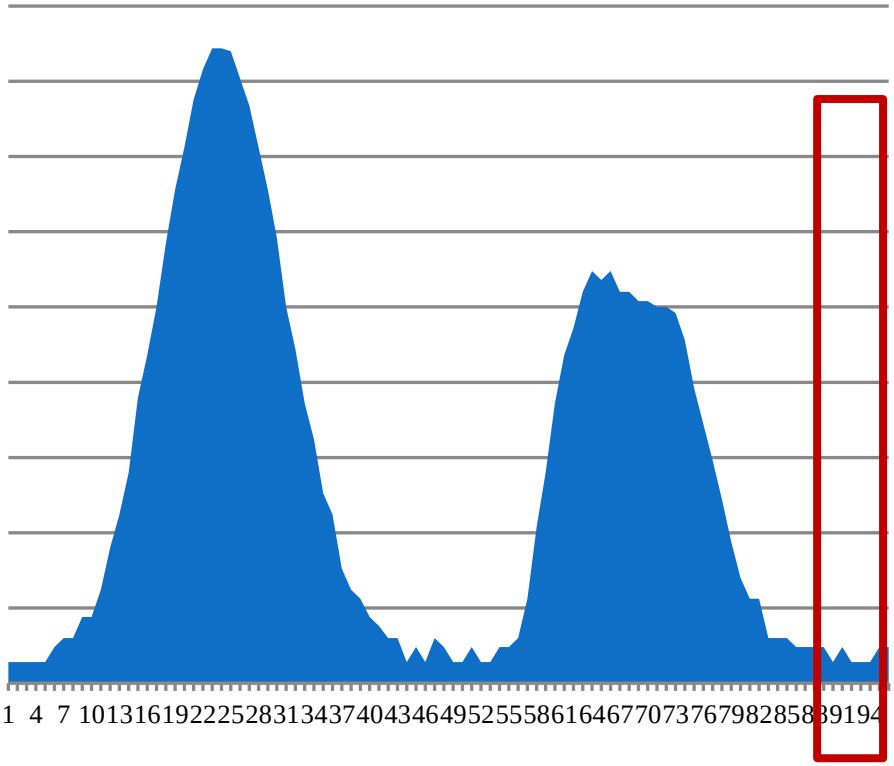
Trailing Flange/Rim/Tread



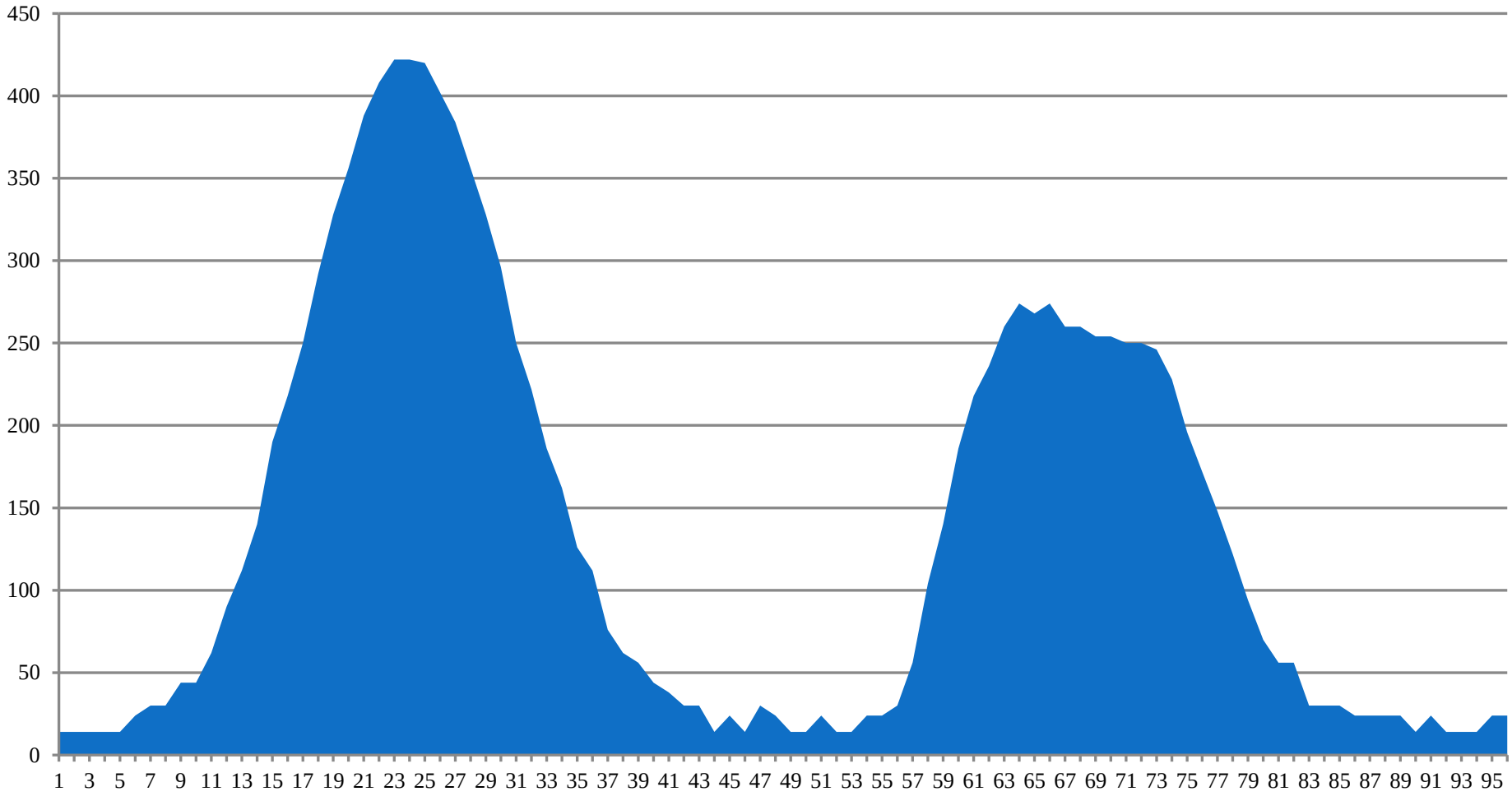


End




1 4 7 10131619222528313437404346495255586164677073767982858391941

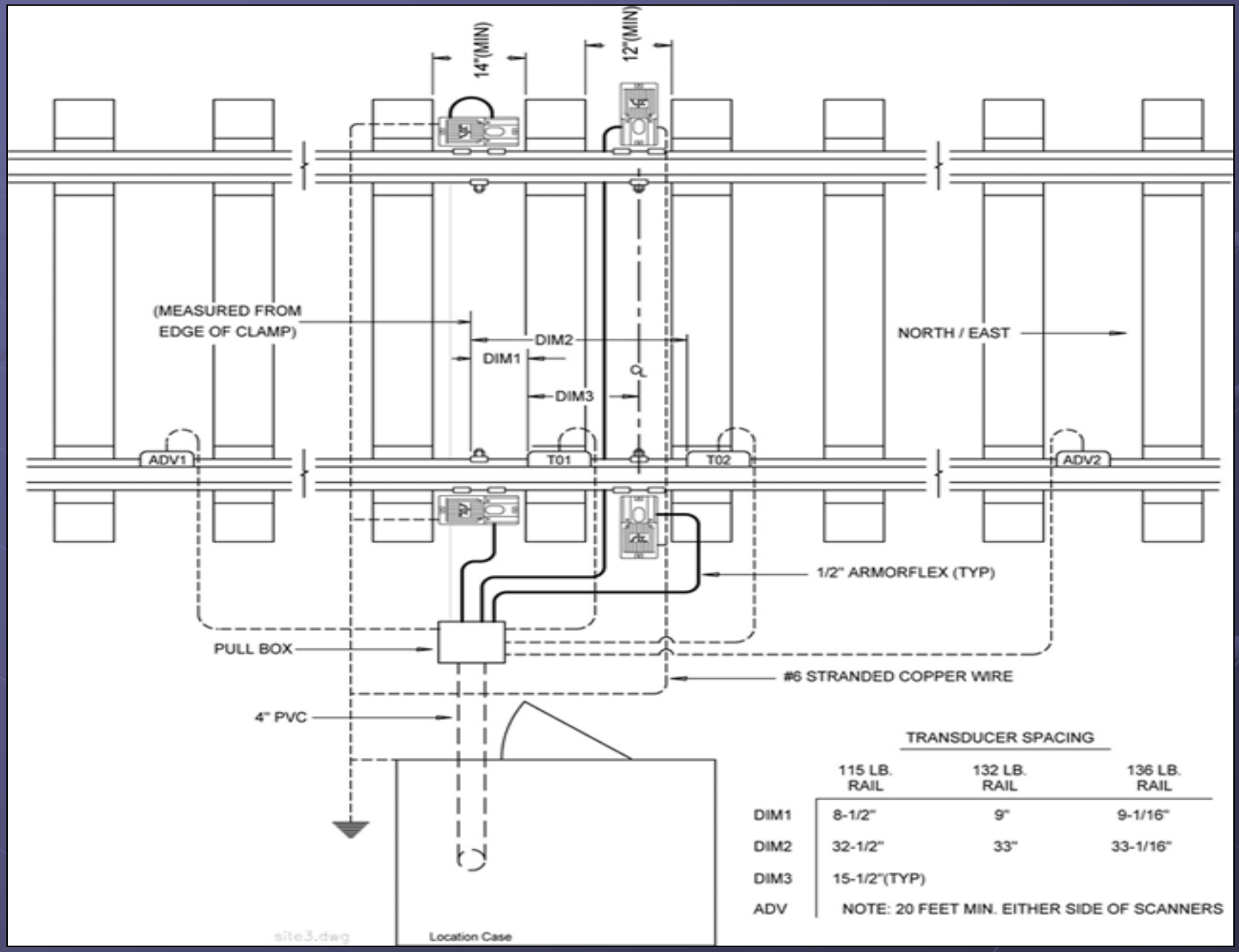
Correct Shape of NG WHEEL DSR



Typical Installation

Typical Installation

Typical Site Layout



TRANSDUCER SPACING

	115 LB. RAIL	132 LB. RAIL	136 LB. RAIL
DIM1	8-1/2"	9"	9-1/16"
DIM2	32-1/2"	33"	33-1/16"
DIM3	15-1/2"(TYP)		
ADV	NOTE: 20 FEET MIN. EITHER SIDE OF SCANNERS		

Scanner Placement

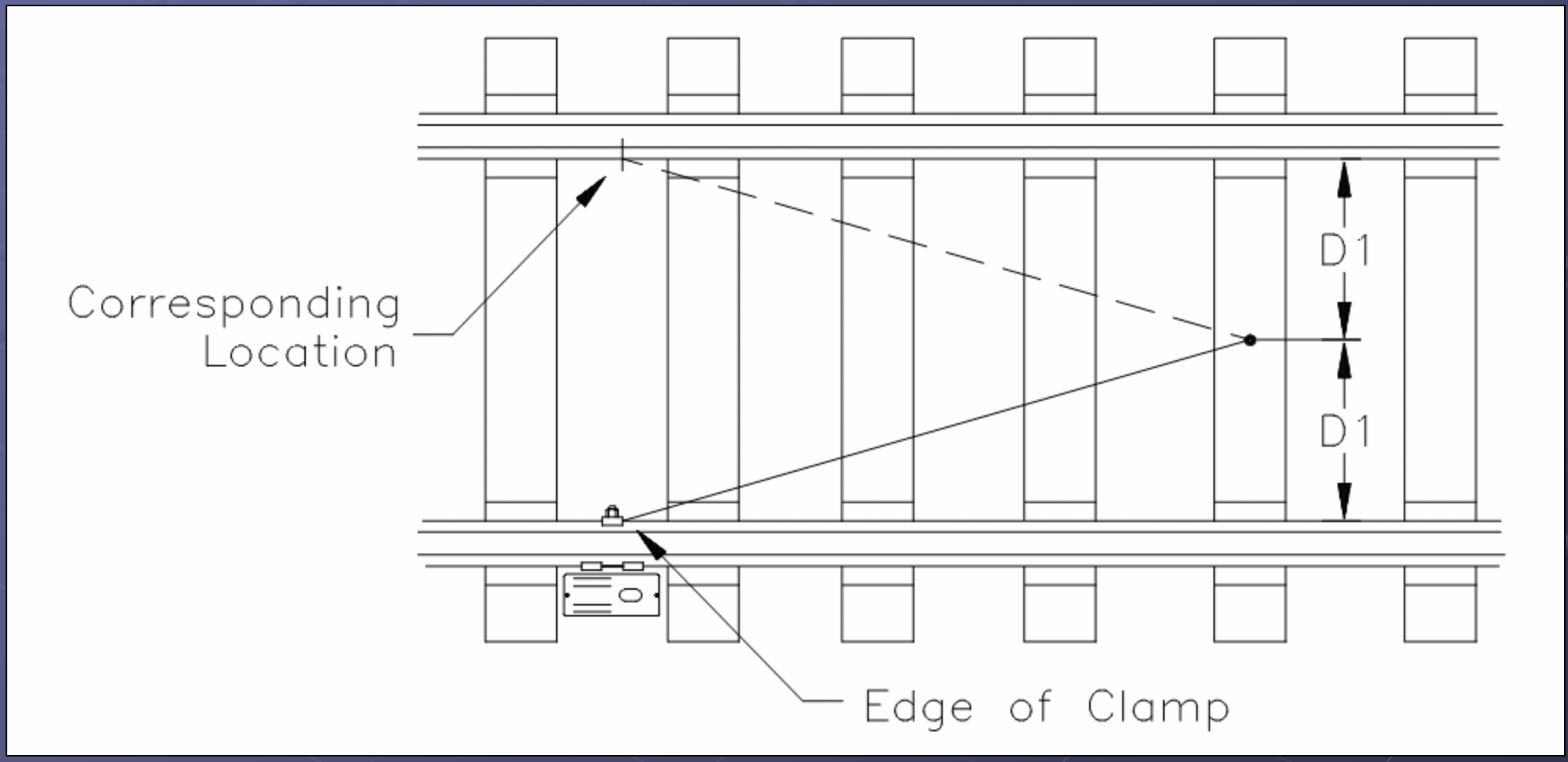
CORRECT

Note - clearance between scanners and ties

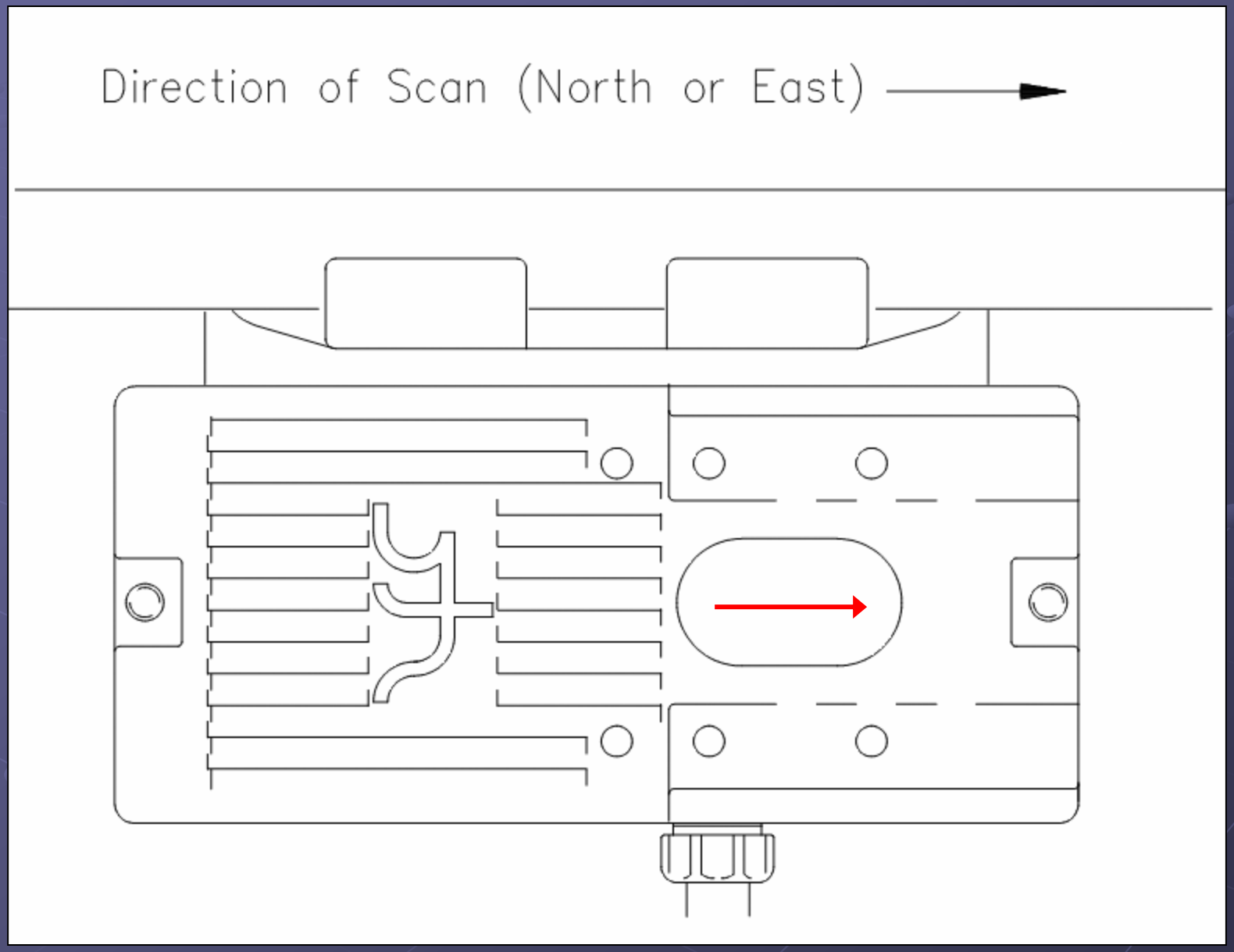
INCORRECT

Note - ties against scanner base

Triangulating Scanners



Scanner Installation



Scan Direction

Northern Hemisphere

Scan NORTH or EAST

Sunshots

Sunshots

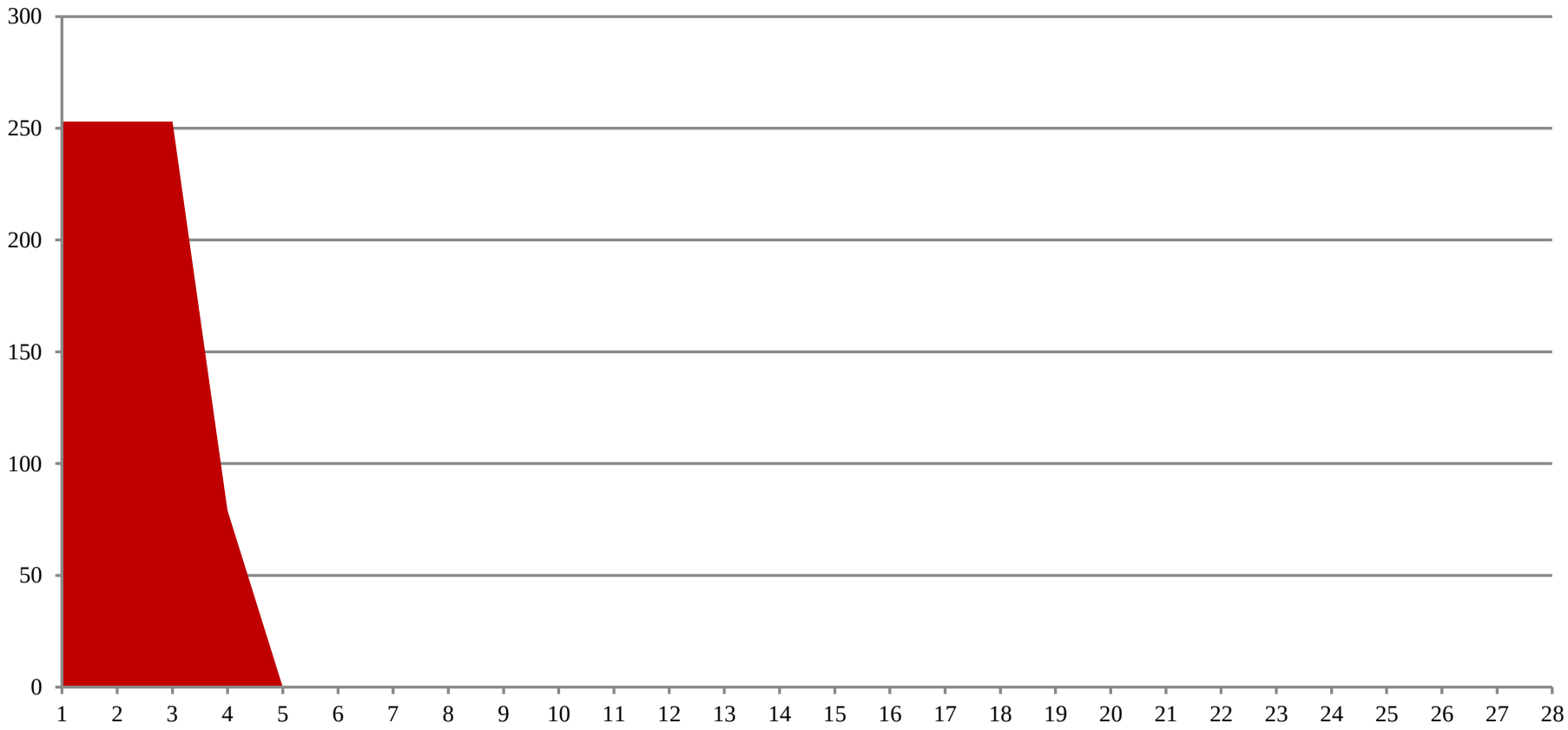
When sun is in direct view of scanner.

Scanner measures is impacted by sun temperature.

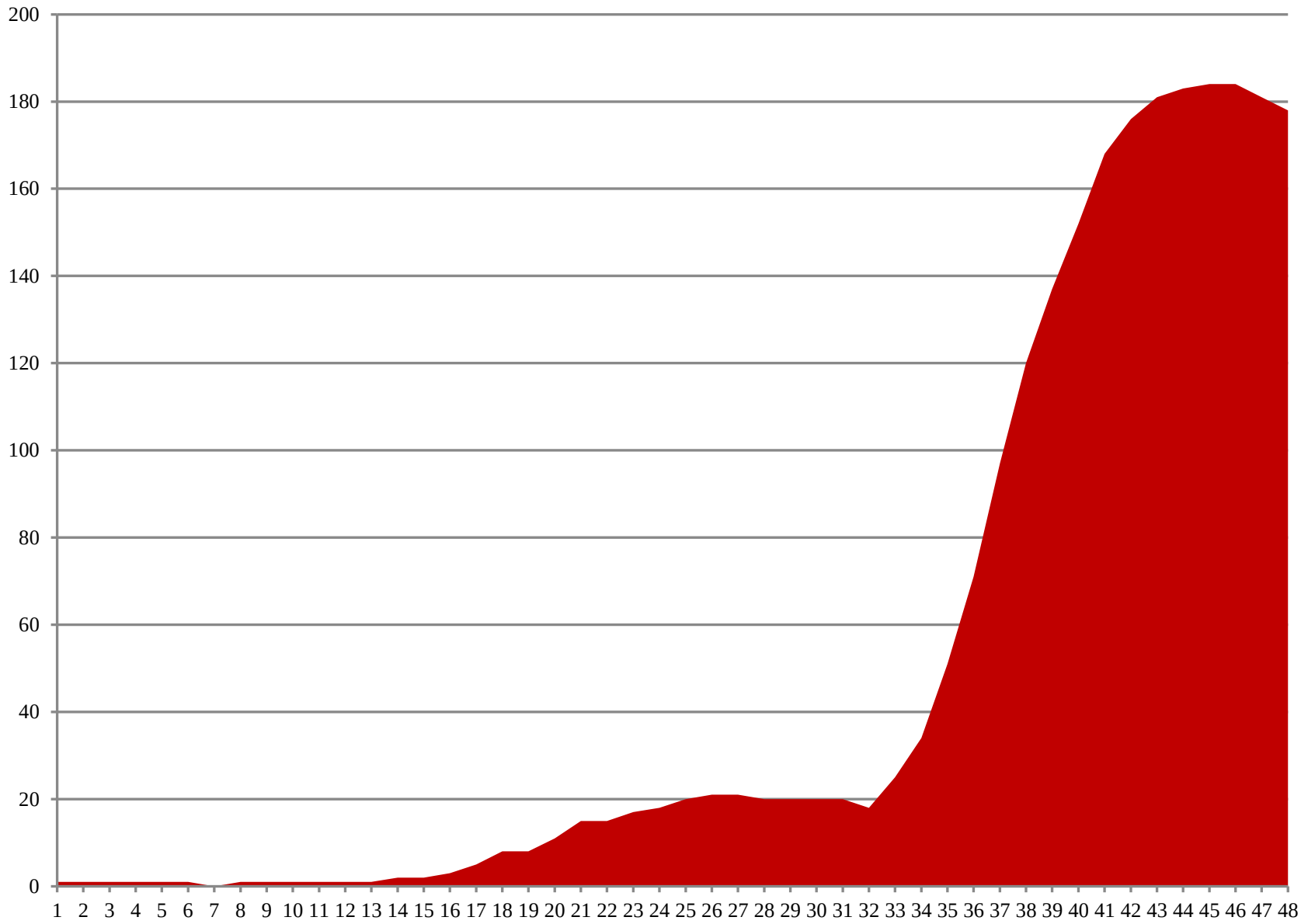
Results in invalid (false) alarms.

DSR/Heat Profile Influences by Sunshot - 1

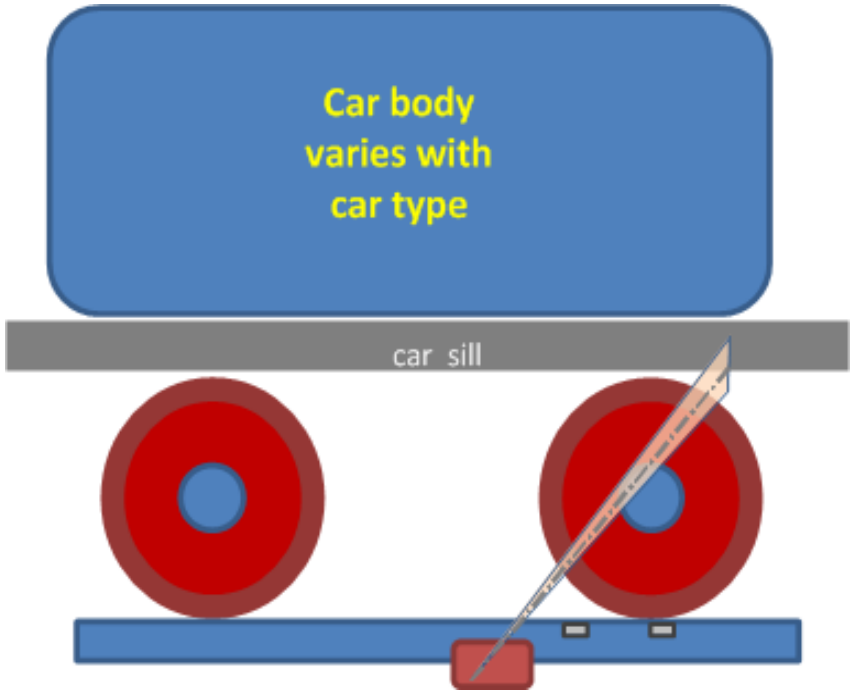
Lindale-2 May 7th, 10:30 a.m.



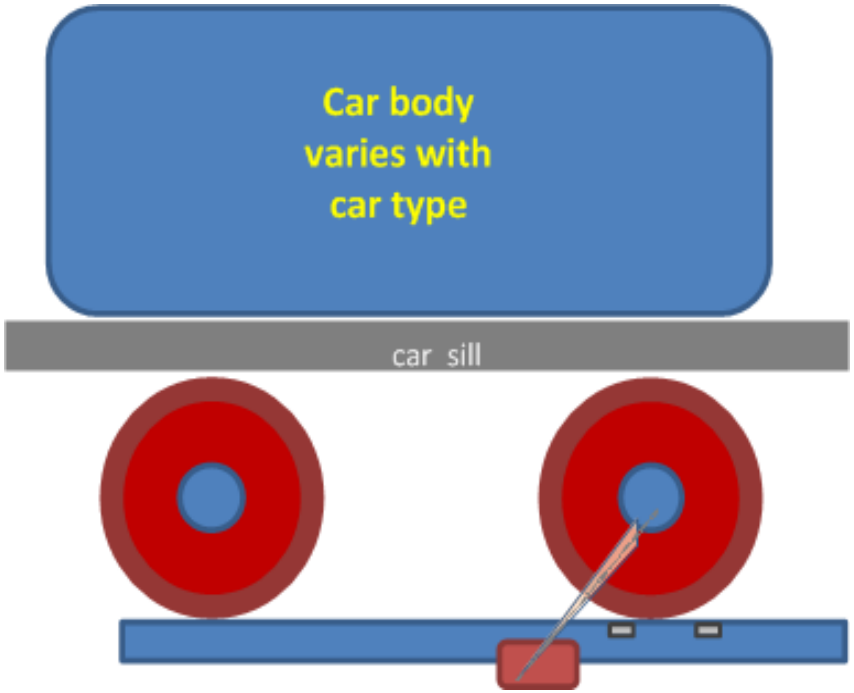
DSR/Heat Profile Influences by Sunshot - 2

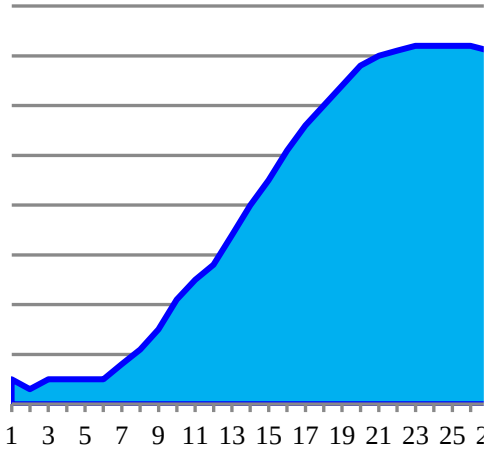


Sunshots

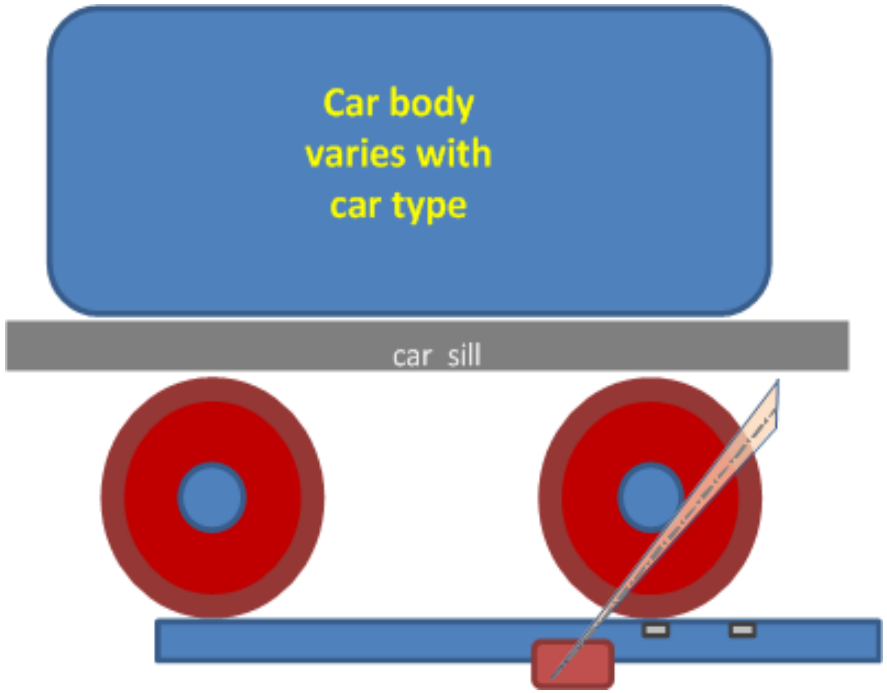


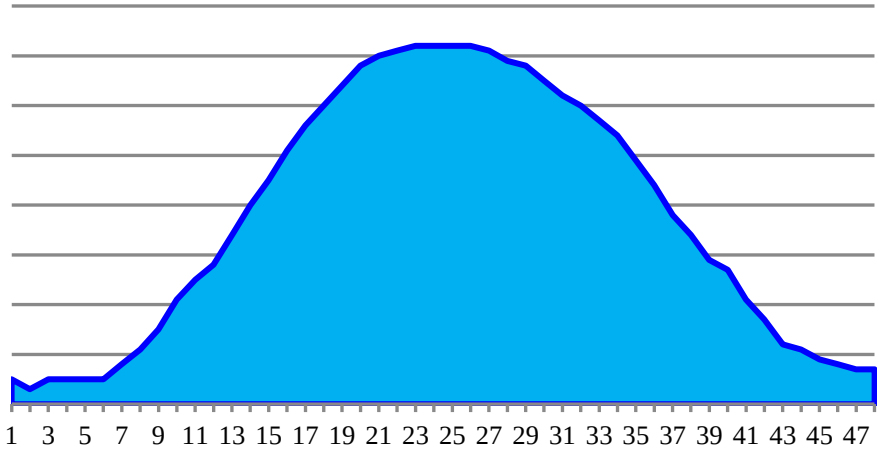
Sunshots


Car body
varies with
car type
car sill

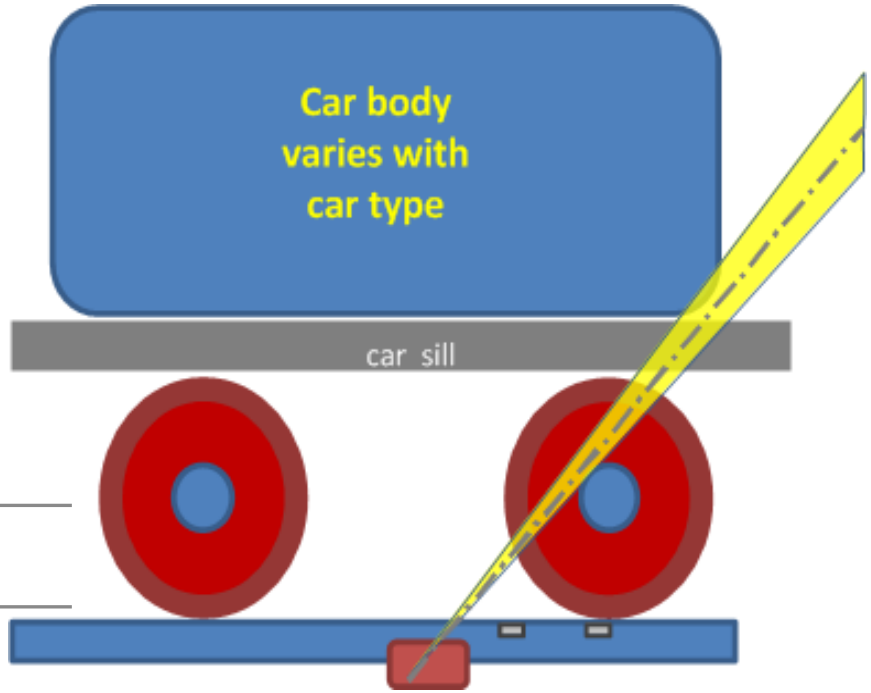

1 3 5 7 9 11 13 15 17 19 21 23 25

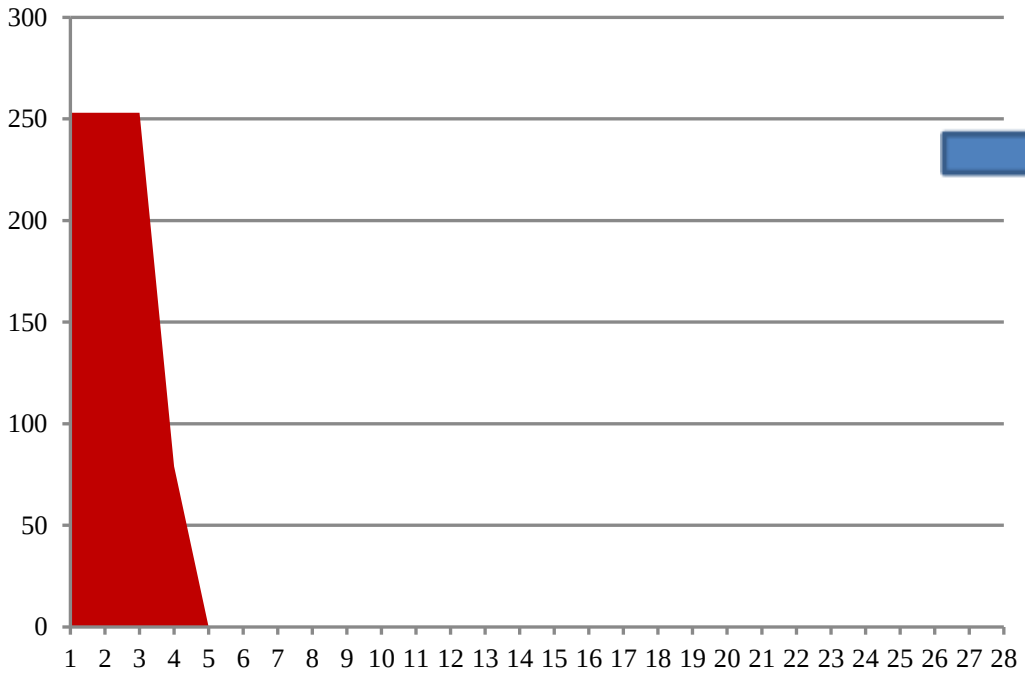
Sunshots


Car body
varies with
car type
car sill

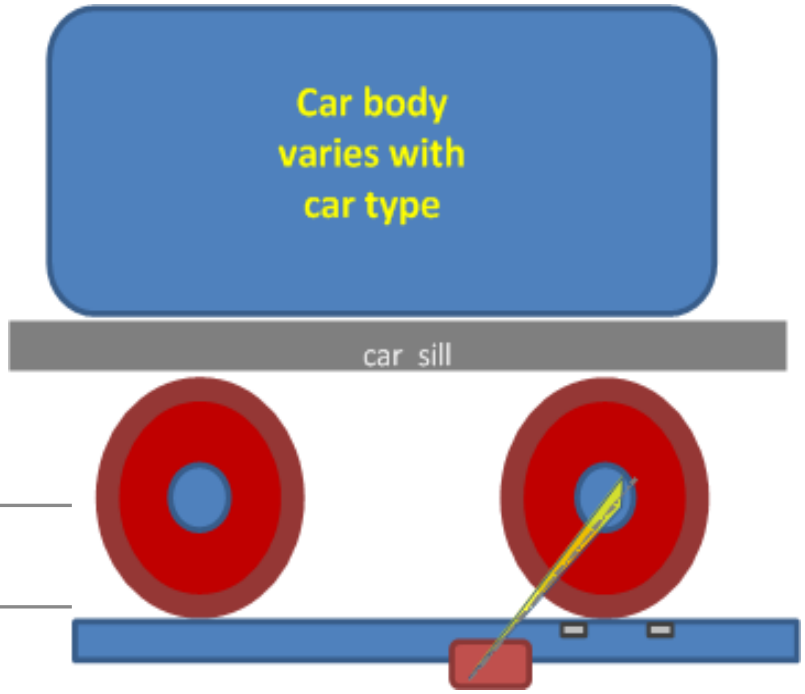

1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47

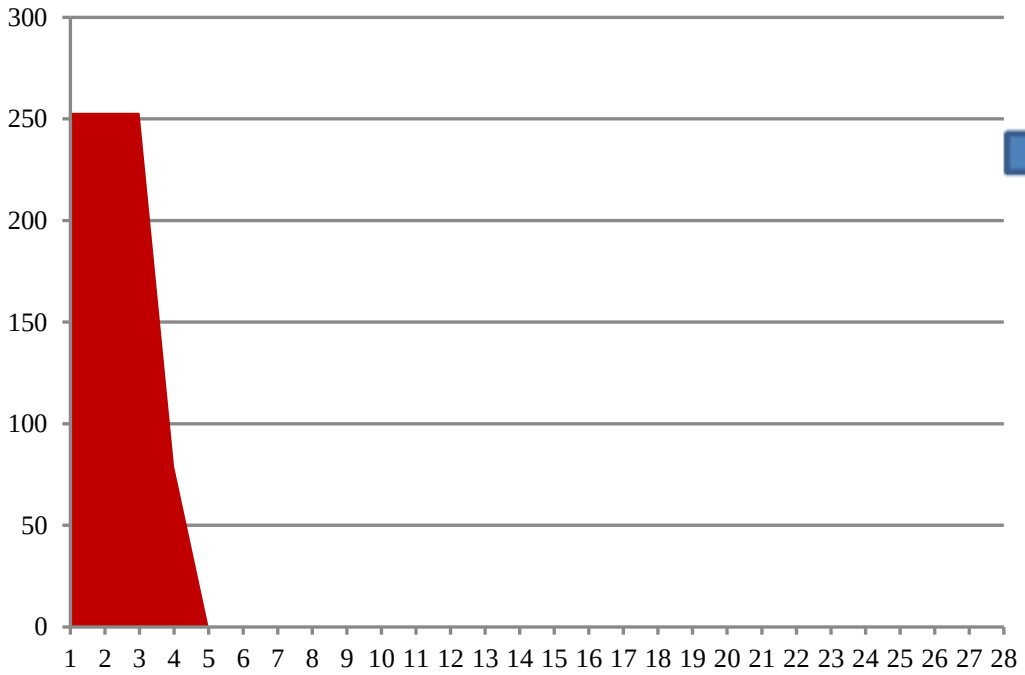
Sunshots


Car body
varies with
car type
car sill

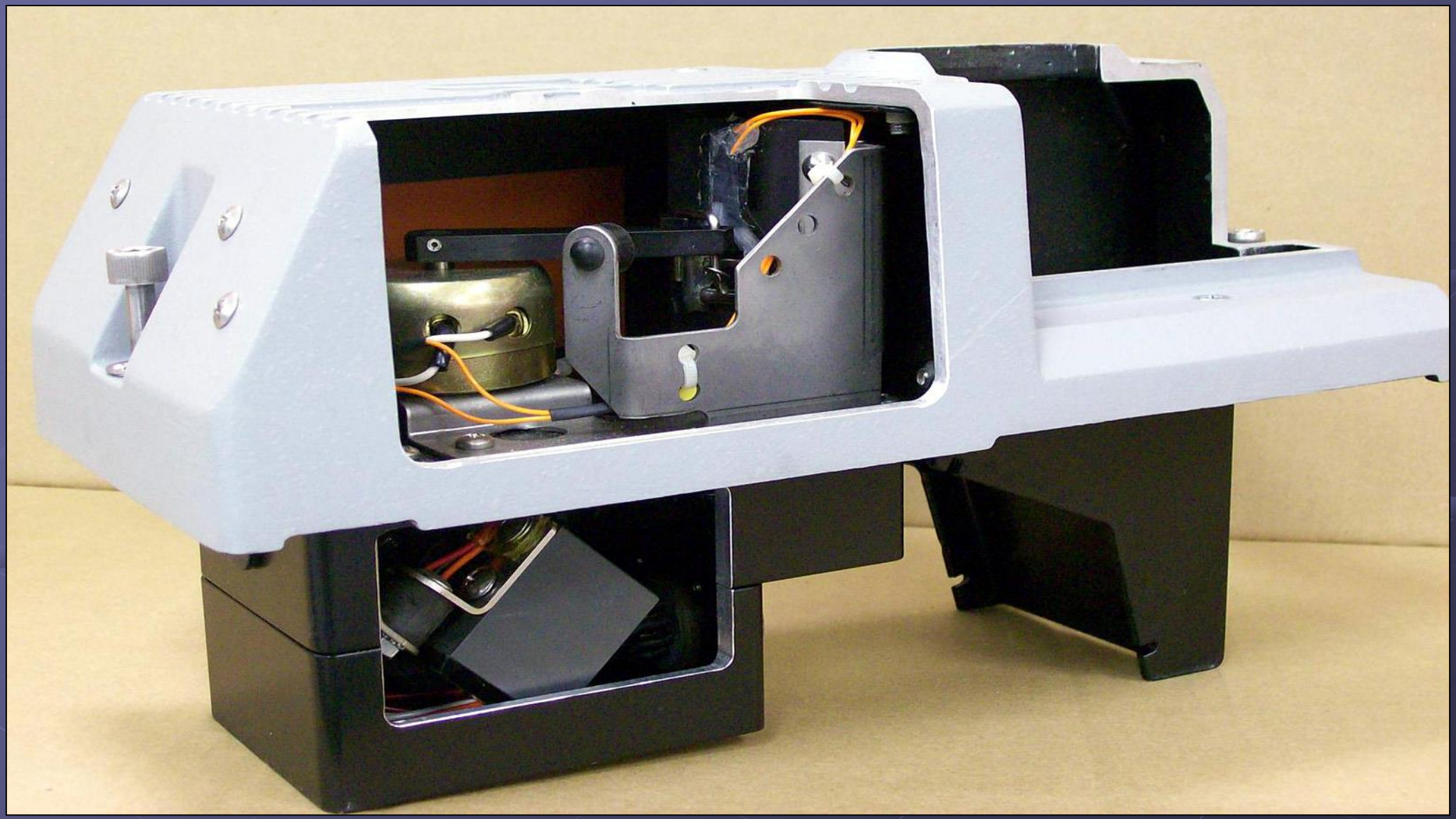

300
250
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

Sunshots

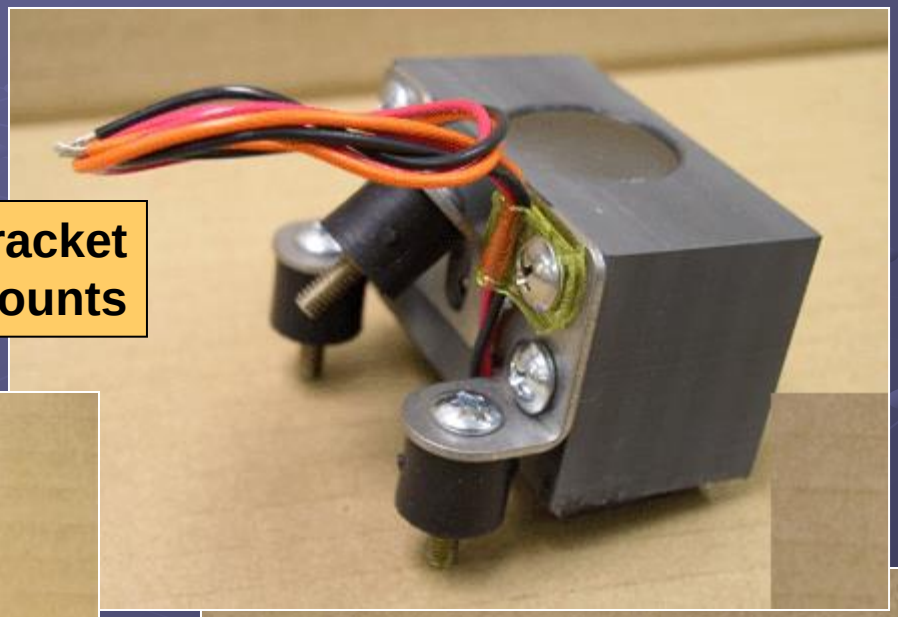

Car body
varies with
car type
car sill


300
250
200
150
100
50
0
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28

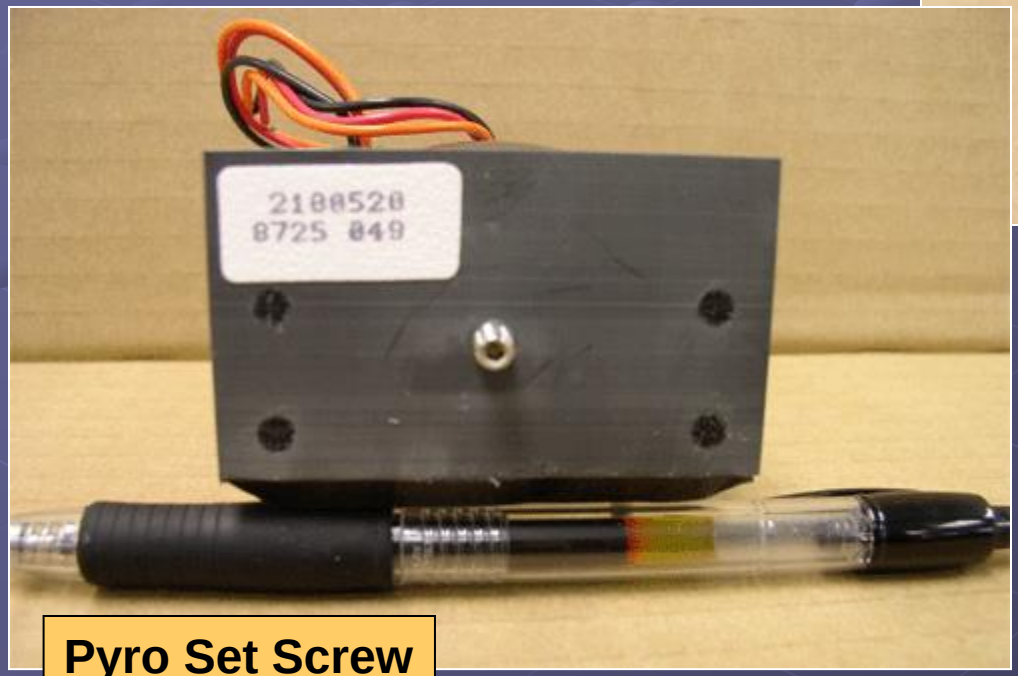
Smart*SCAN NG* – Type II Scanner



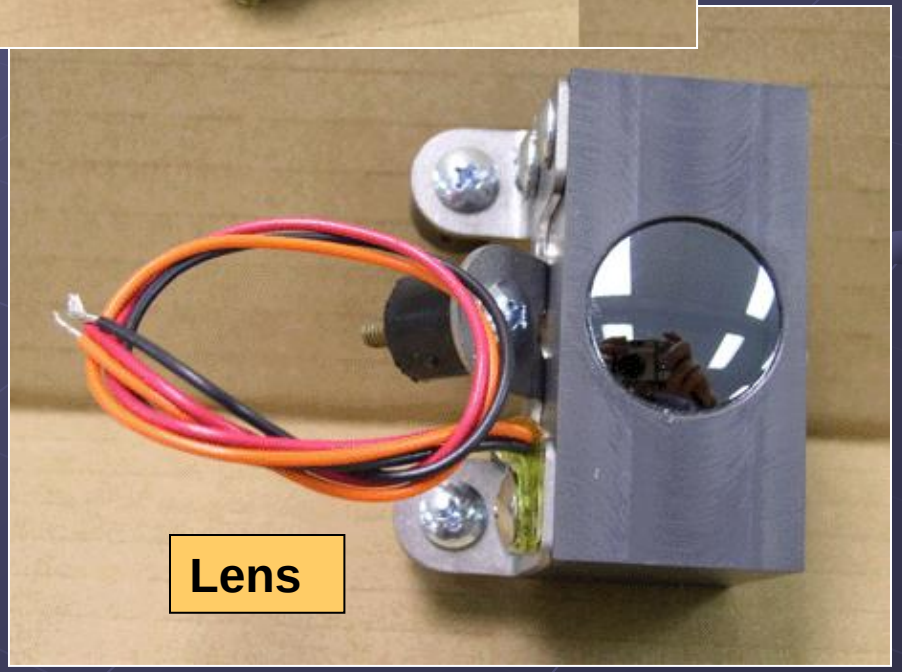
Smart*SCAN* NG – Type II Scanner Pyro Block



Mounting Bracket
Shock Mounts

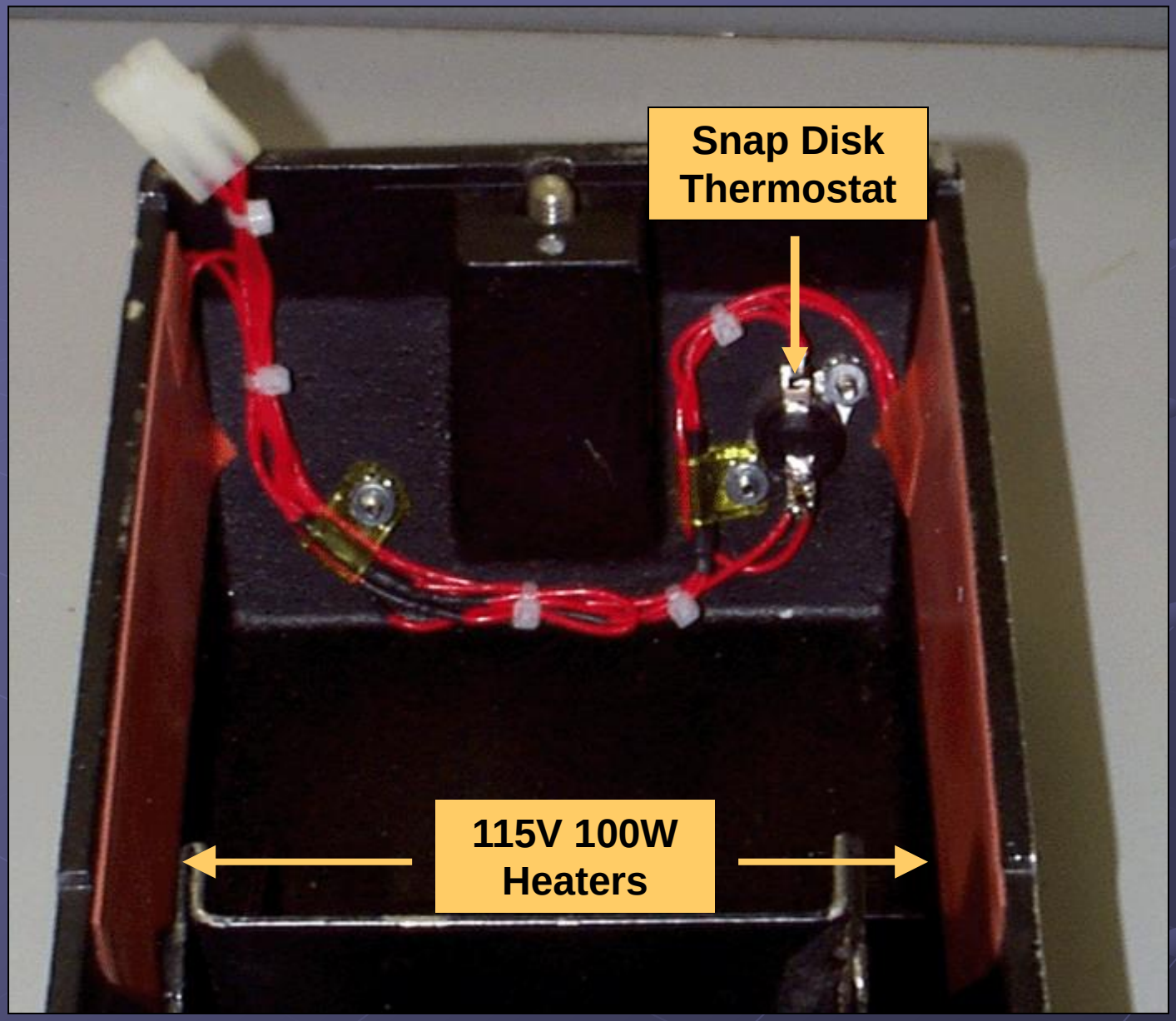


Pyro Set Screw
(factory set)



Lens

Smart*SCAN* NG – Type II Scanner Heater

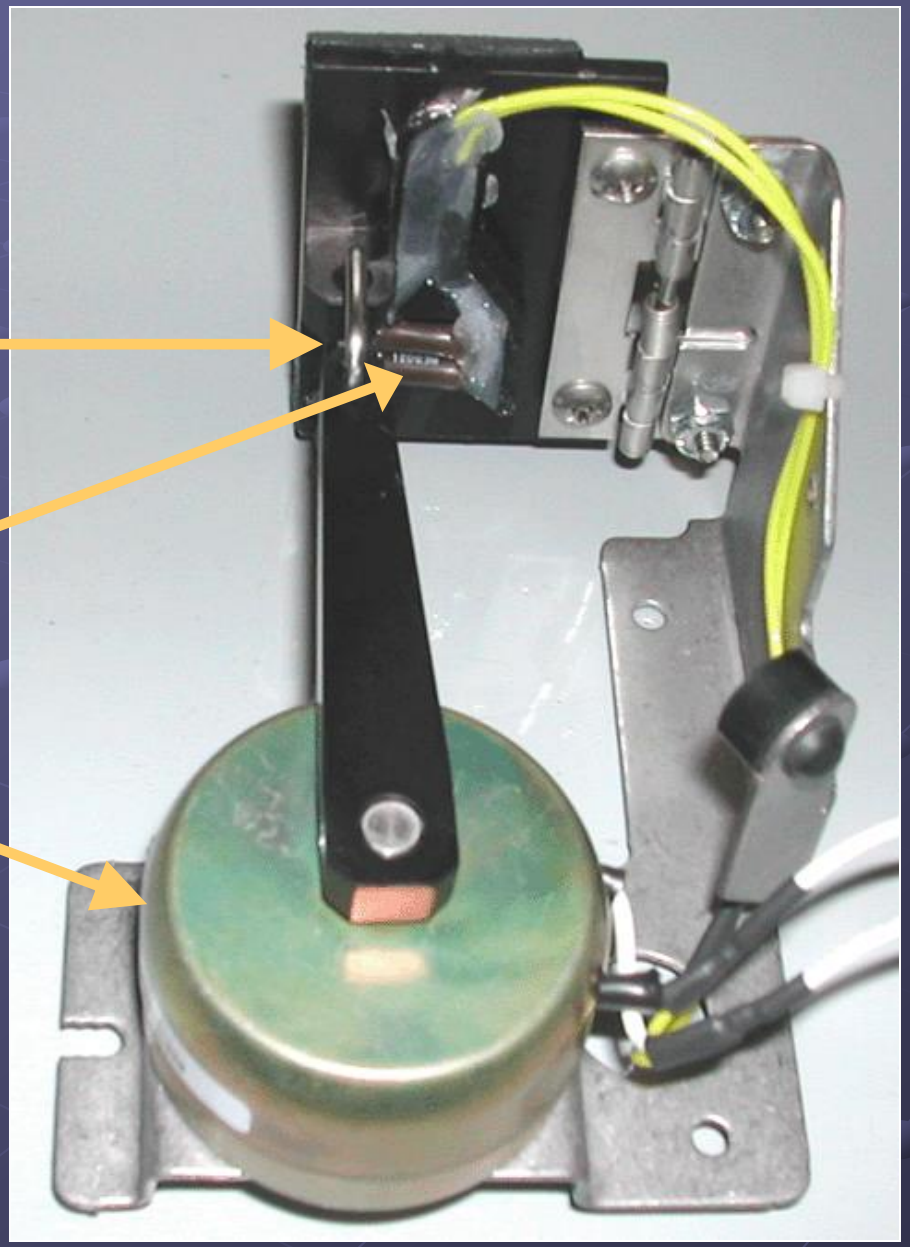


SmartSCAN NG – Type II Scanner Shutter

Shutter Door Link (service with dry lubricant)

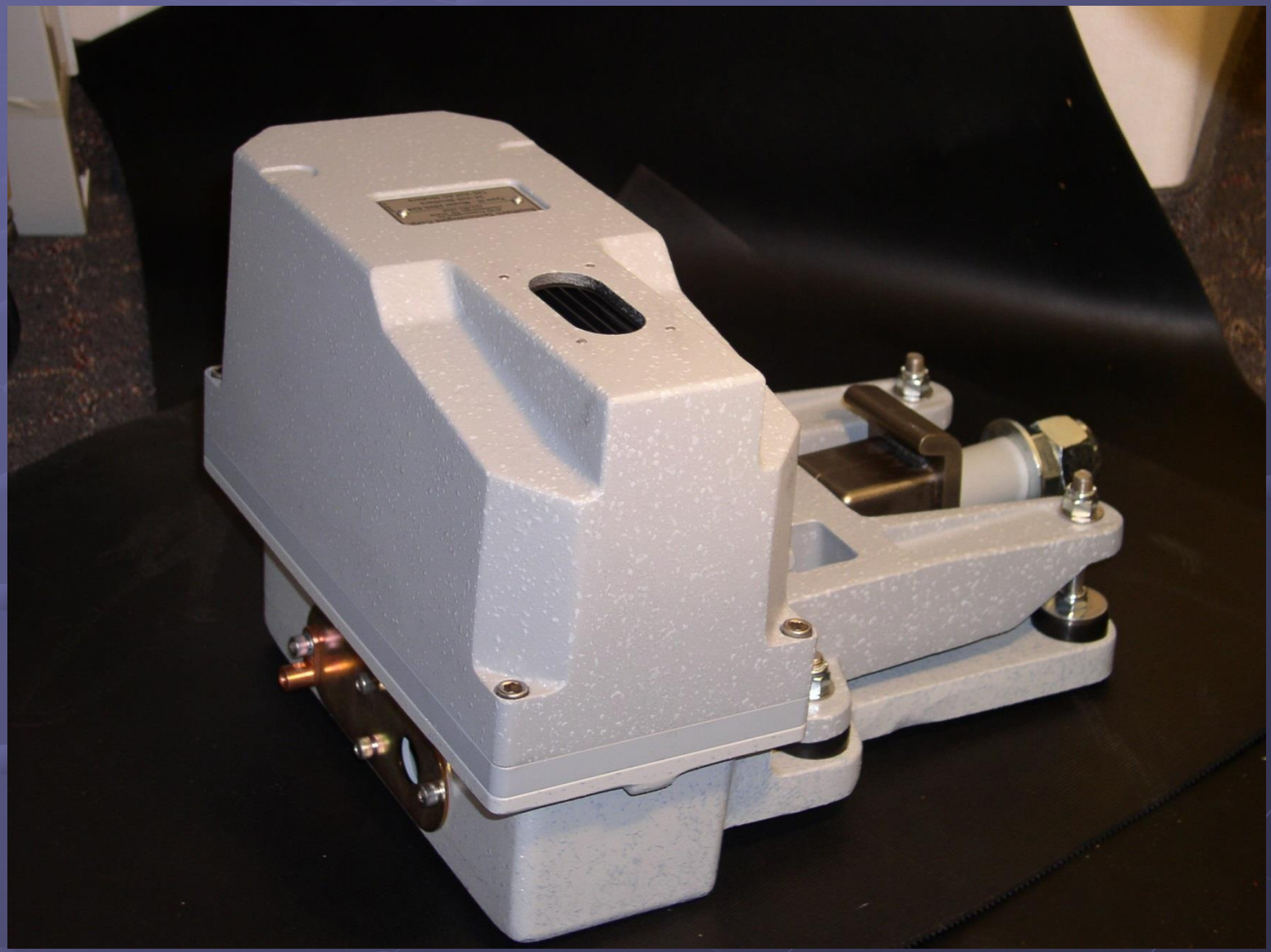
Integrity Check Resistors

Shutter Solenoid 12 volt



➢ Service with a dry lubricant.

Smart*SCAN NG* – Type III Scanner



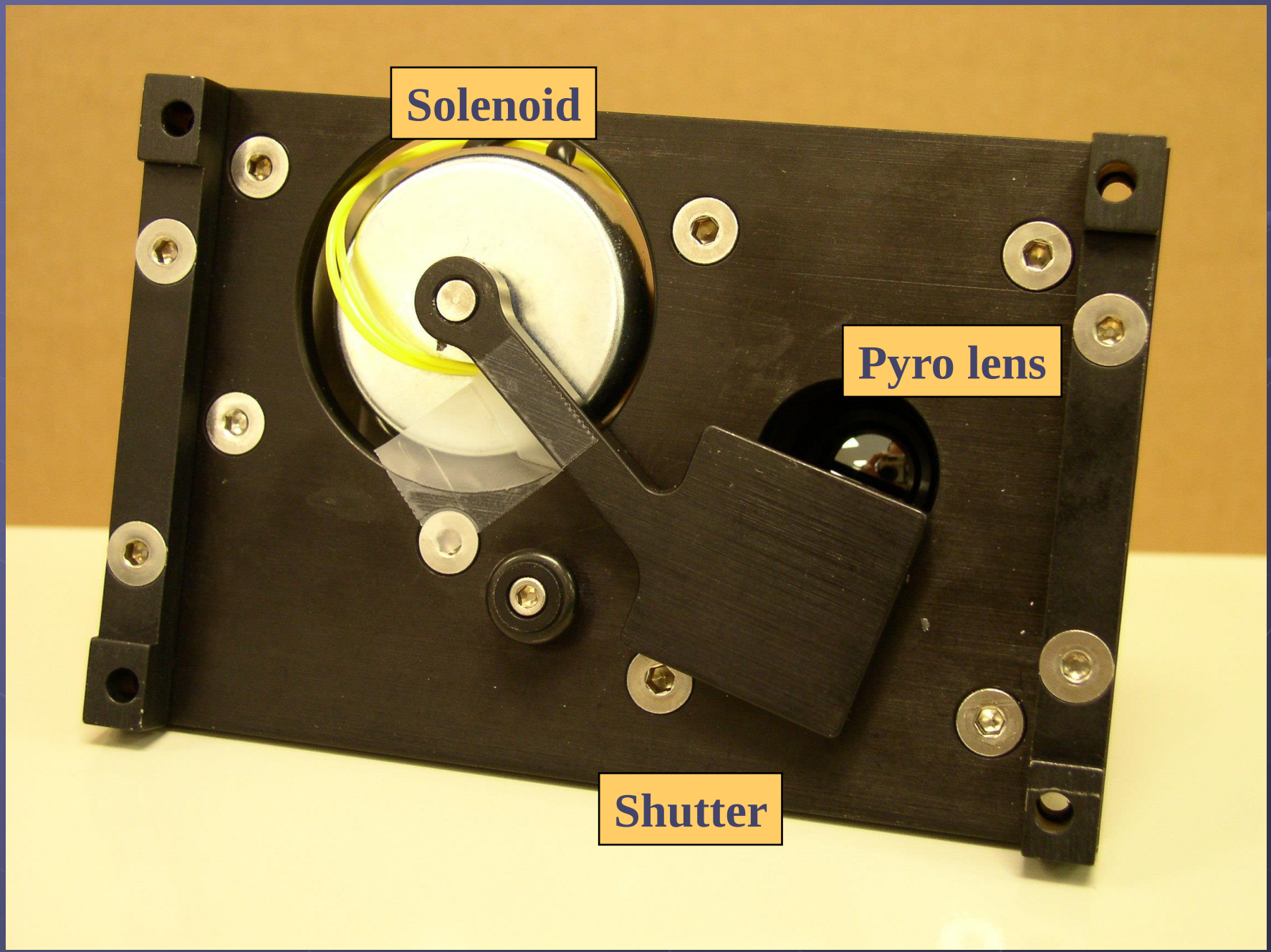
SmartSCAN NG – Typer III Scanner

Identification plate

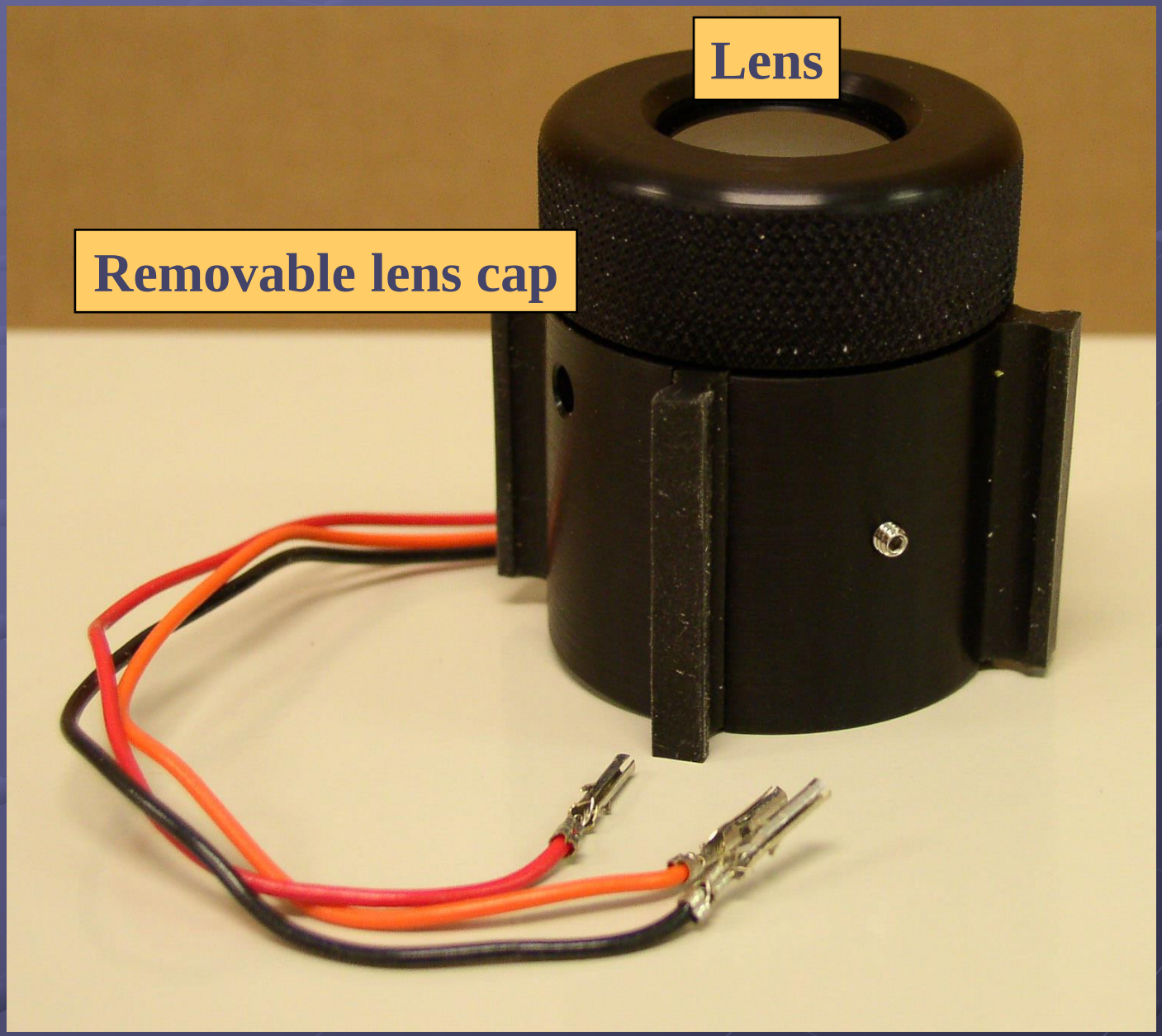
Cover Heater

Smart*SCAN NG* – Typer III Scanner

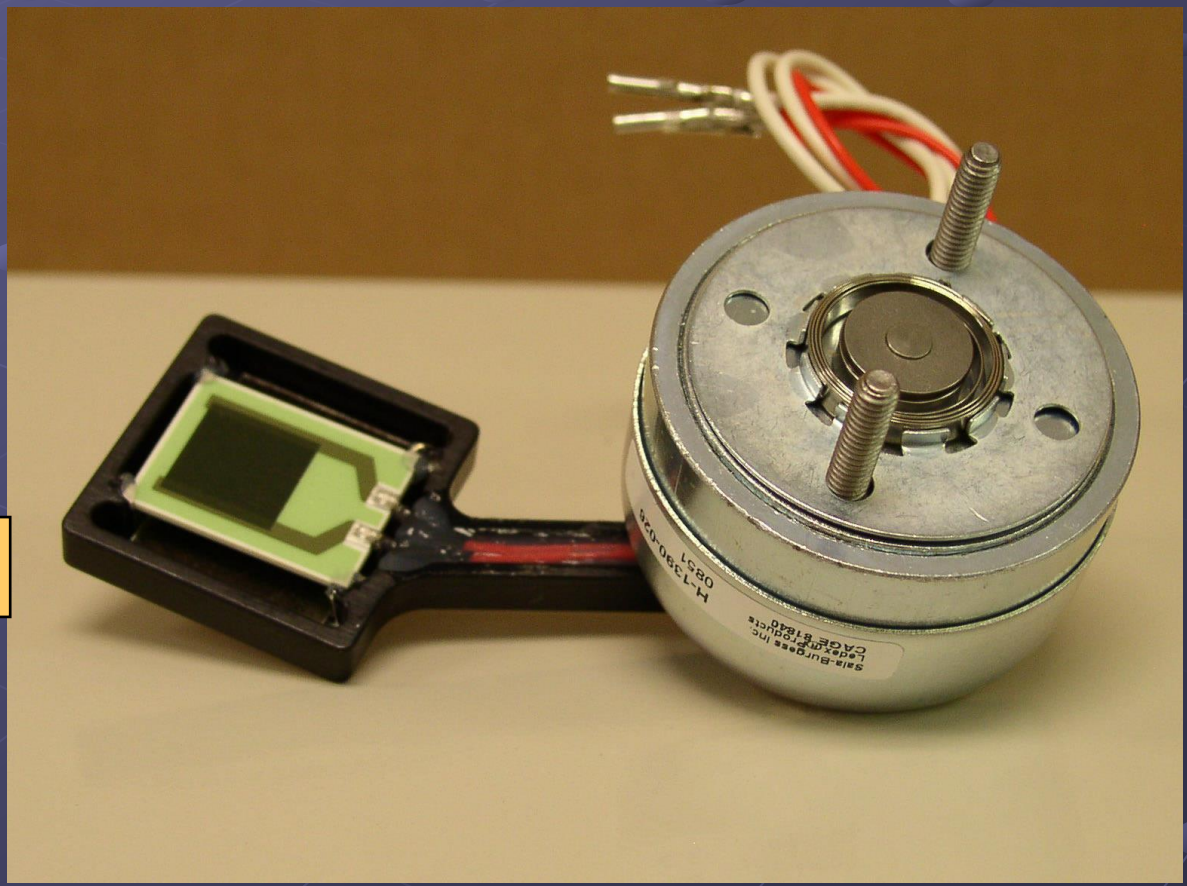
Smart*SCAN NG* – Typer III Pyro shutter insert



Smart*SCAN NG* – Typer III Pyro

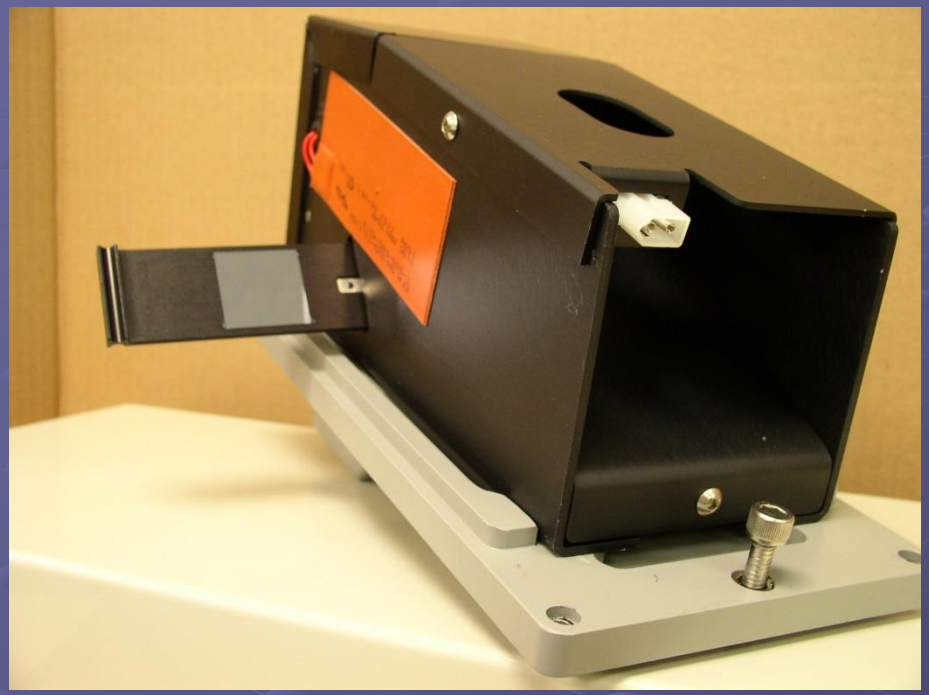


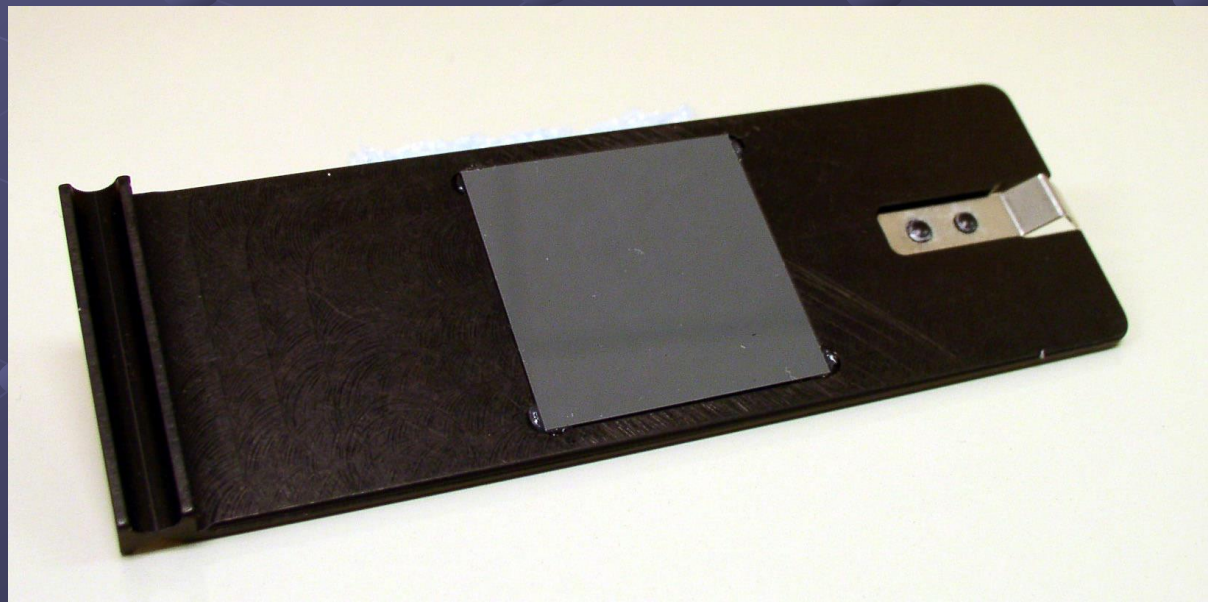
SmartSCAN NG – Typer III Shutter/Solenoid



Shutter Heater board

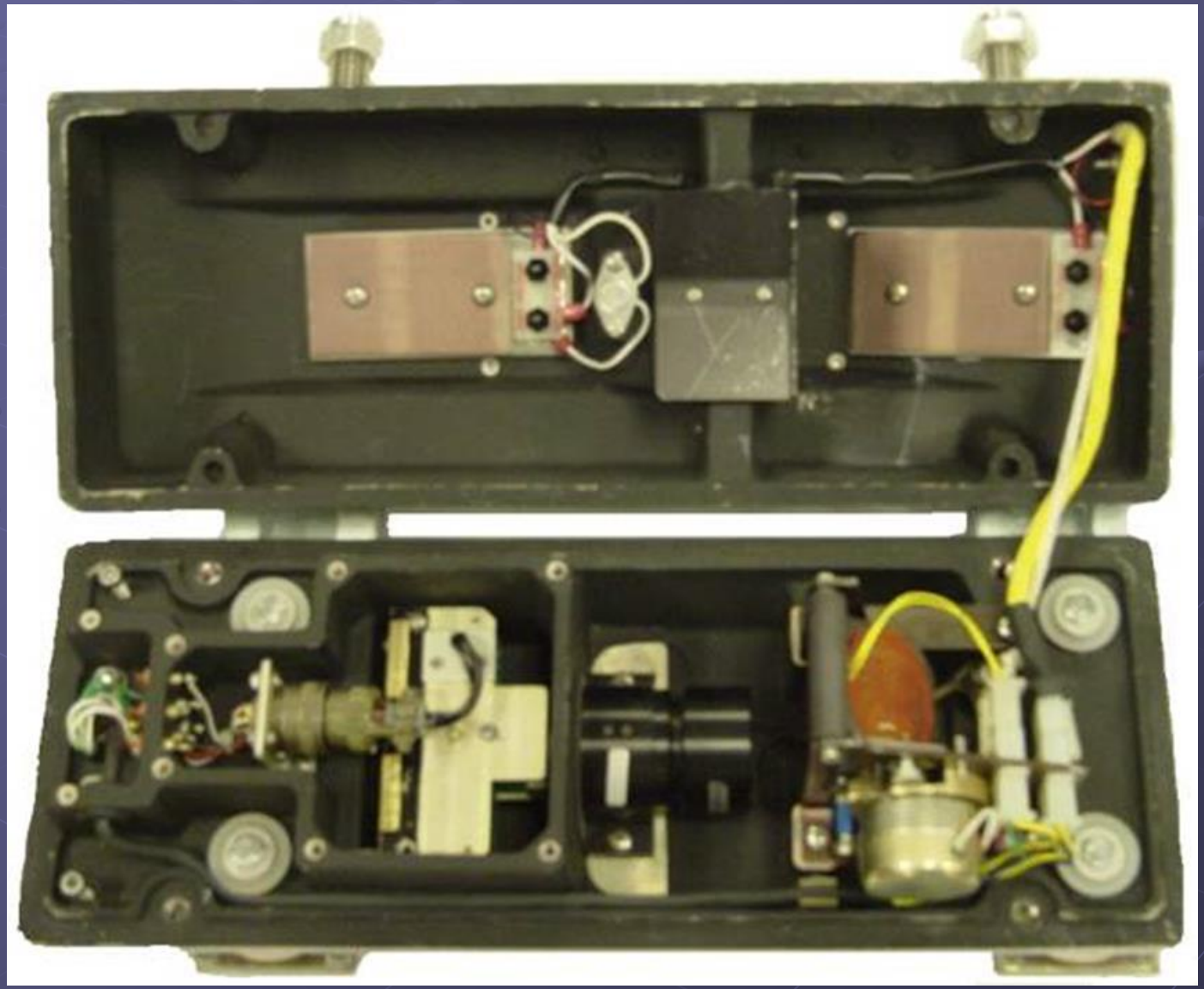
Smart*SCAN NG* – Typer III Filter slide



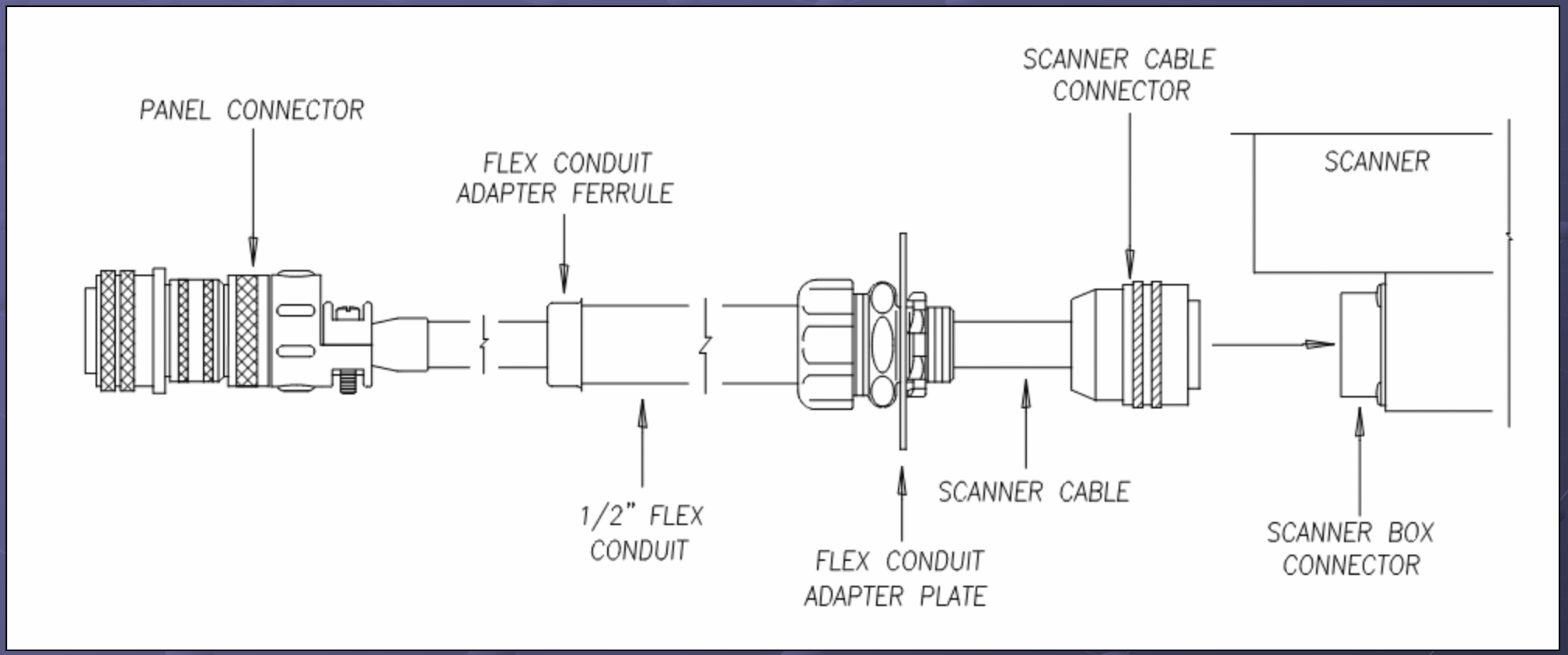


Micro – ACS II Bearing Scanner

Micro – ACS II Bearing Scanner

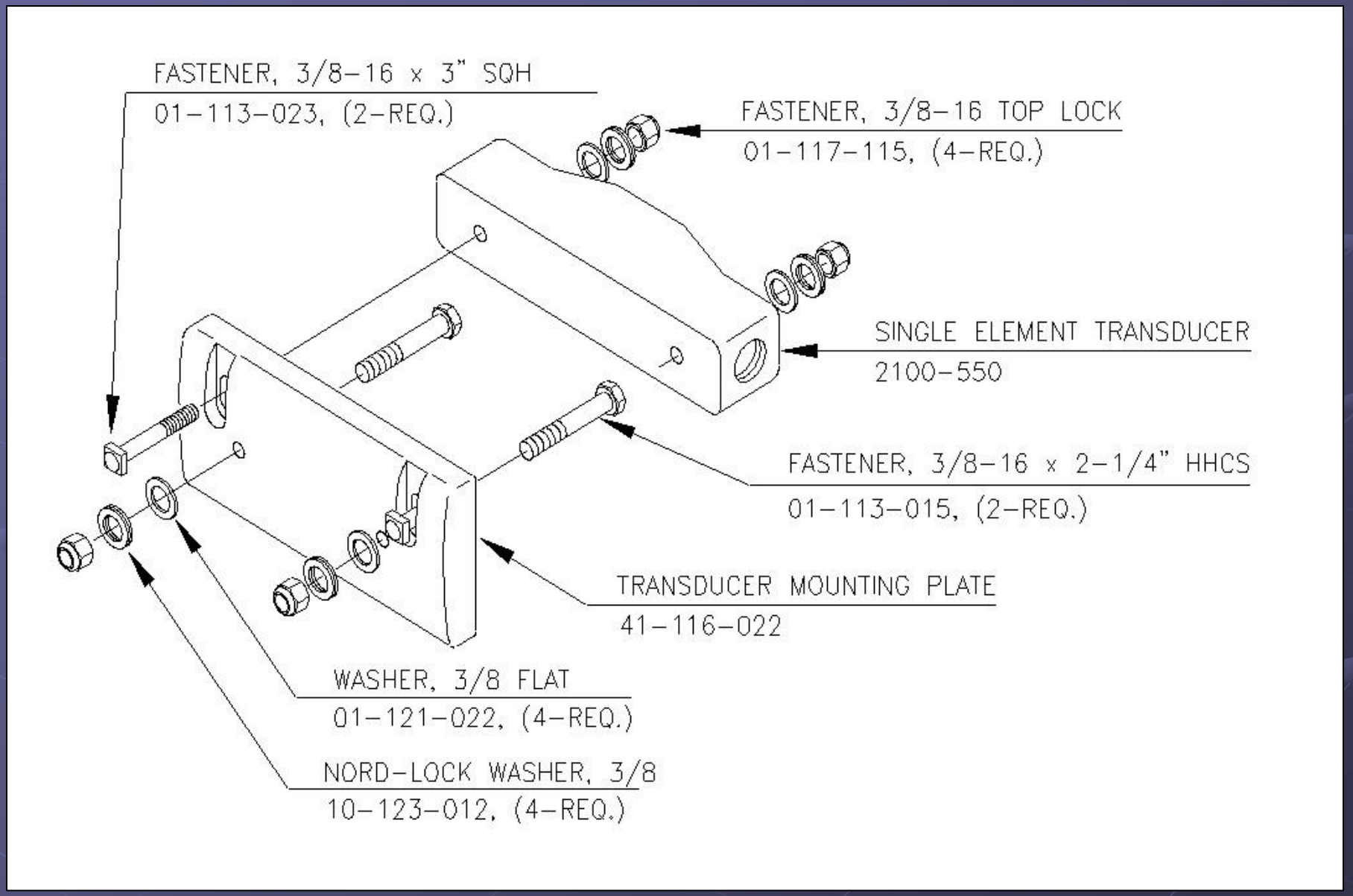


Scanner Cables



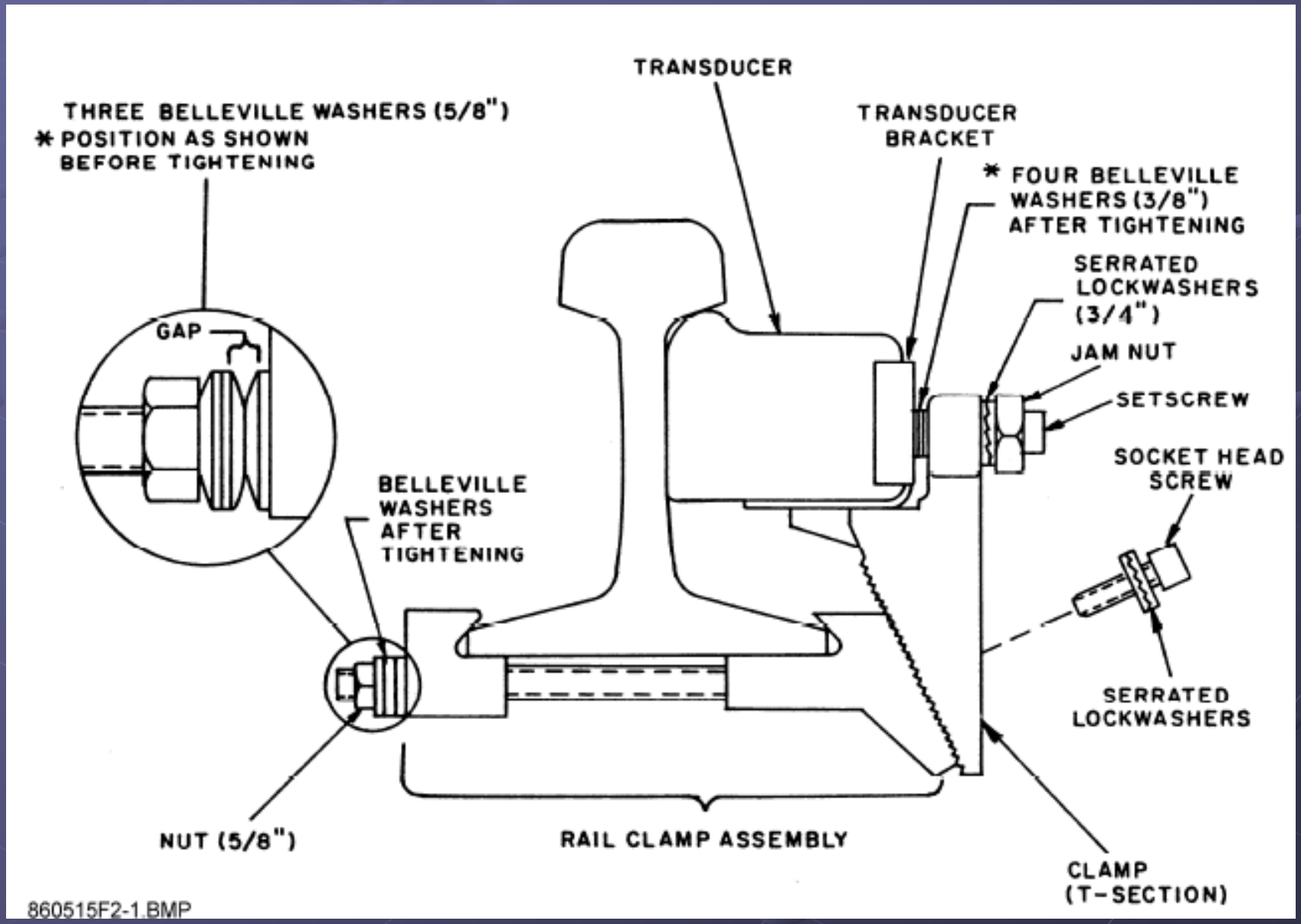
Smart*SCAN* NG – Transducer

SmartSCAN NG – Transducer

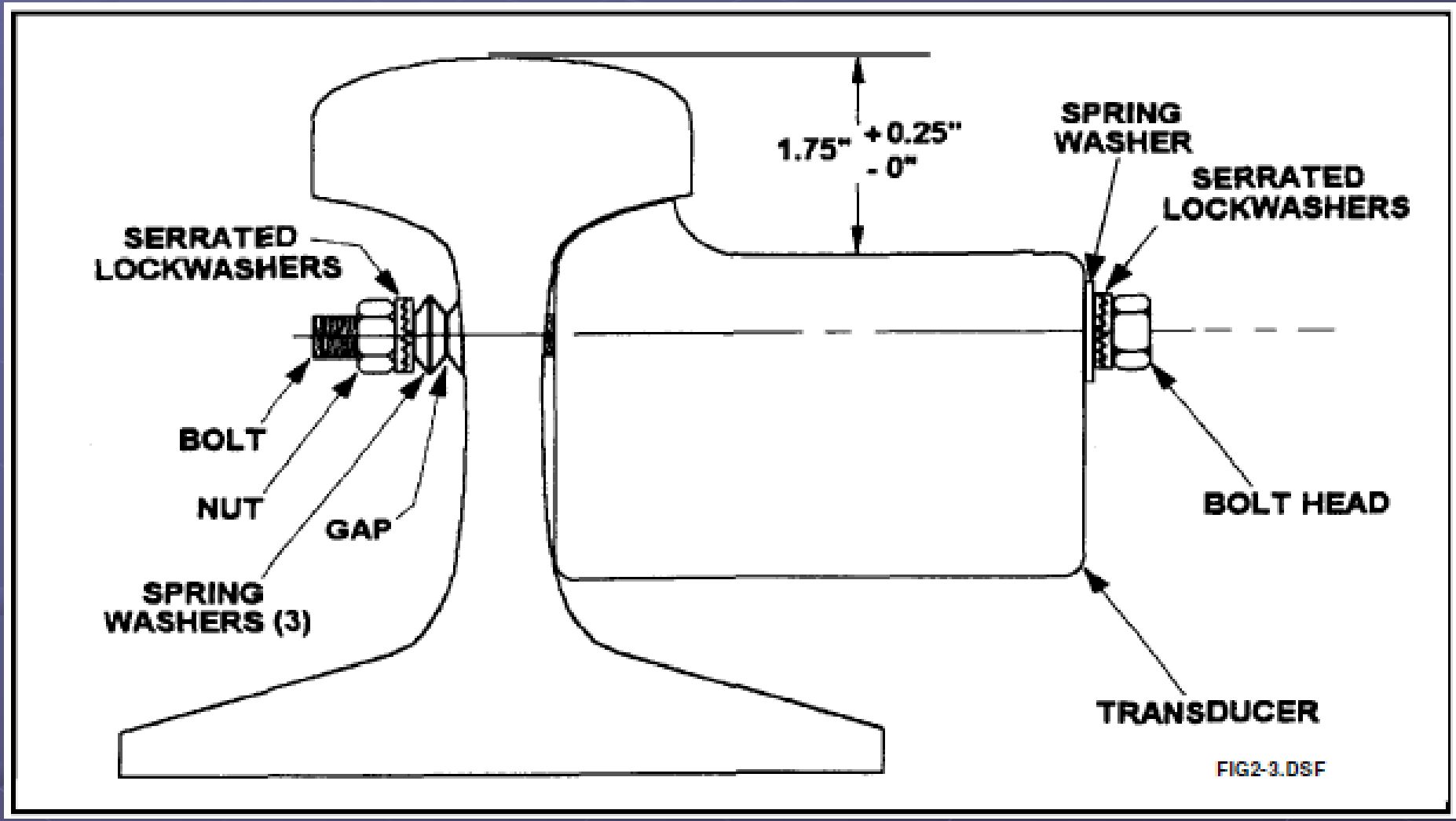


Micro – Transducer

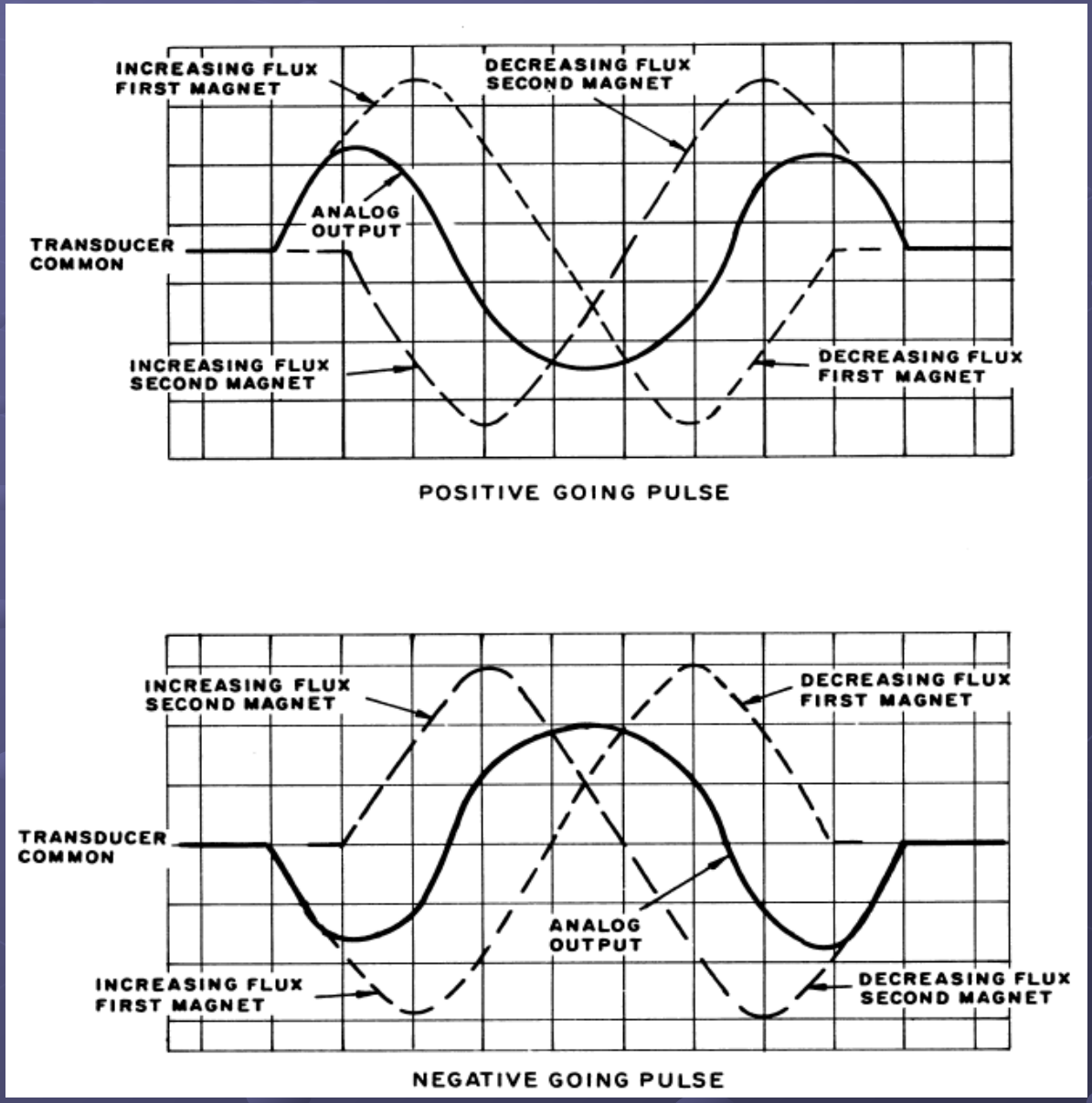
Micro – Mounting



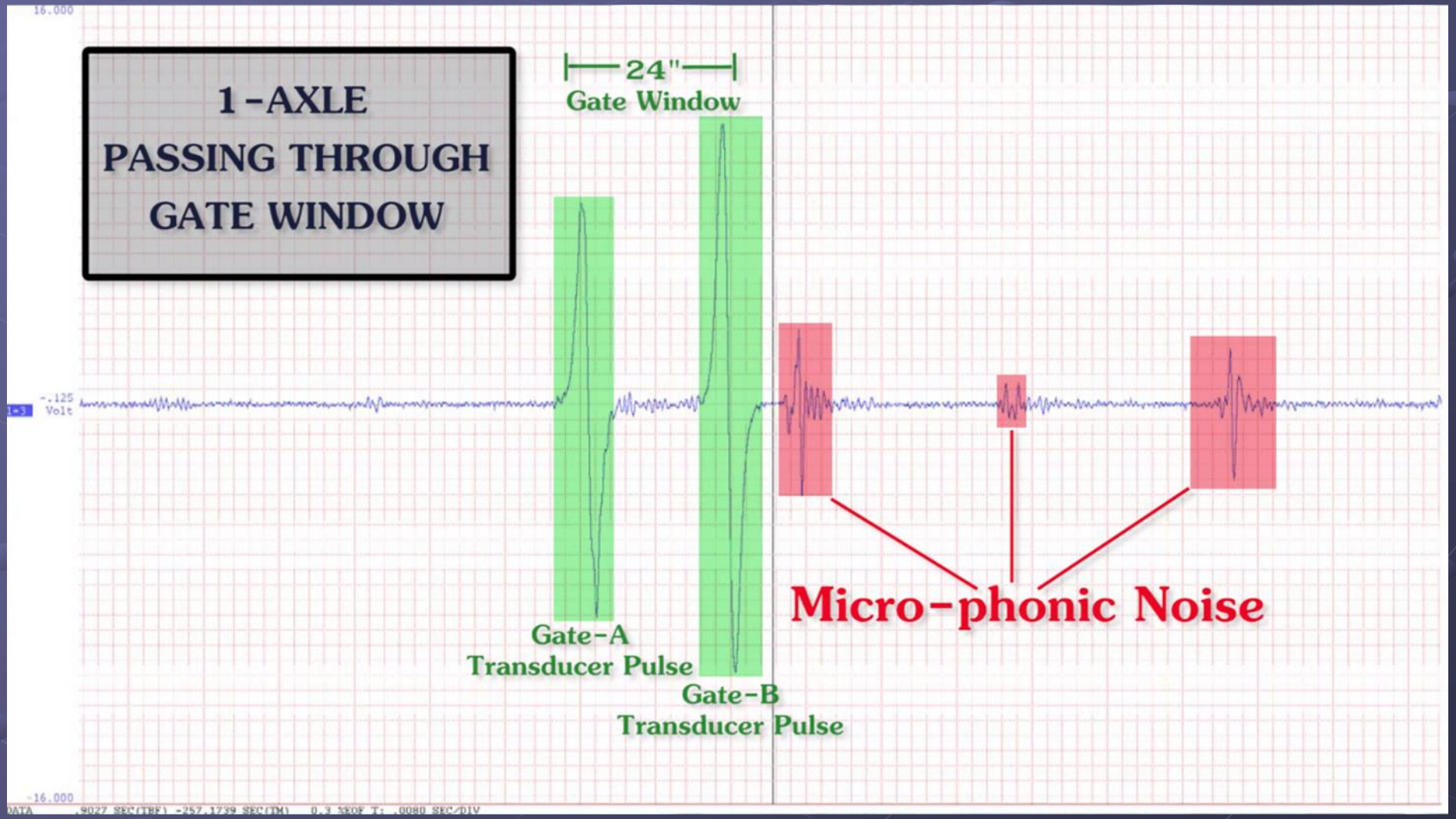
Micro – Mounting



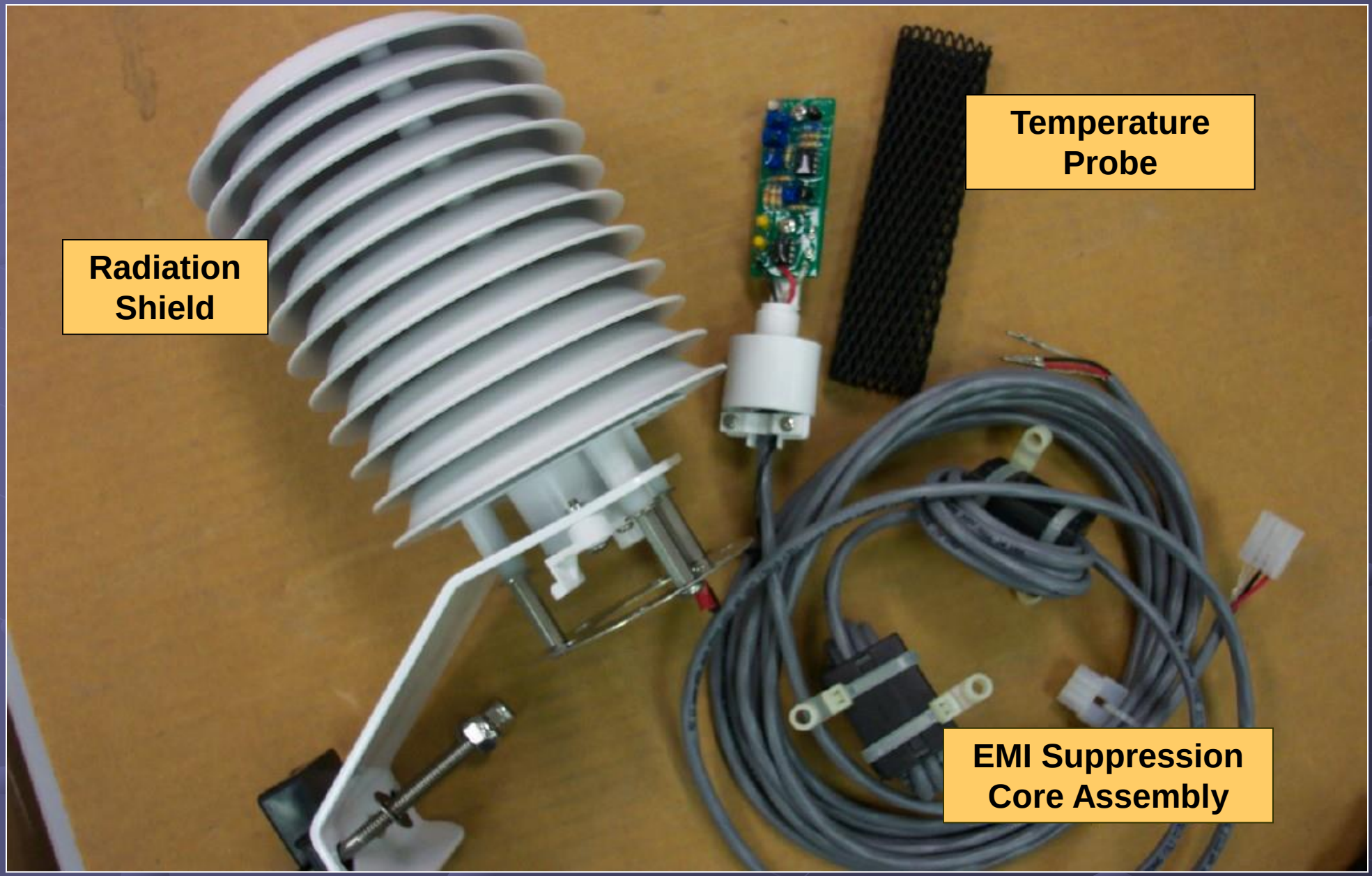
Transducer Signal



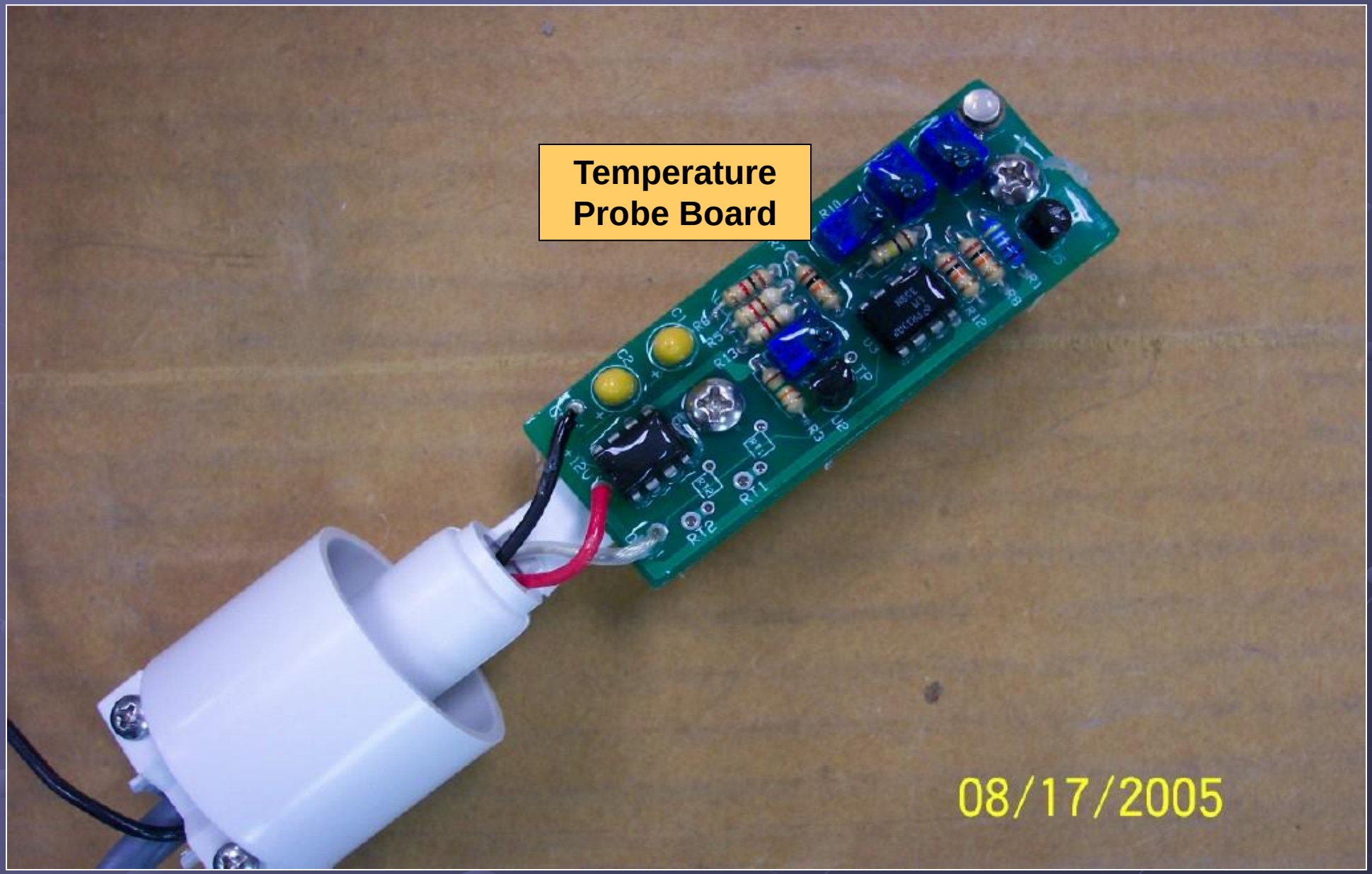
Transducer Signal



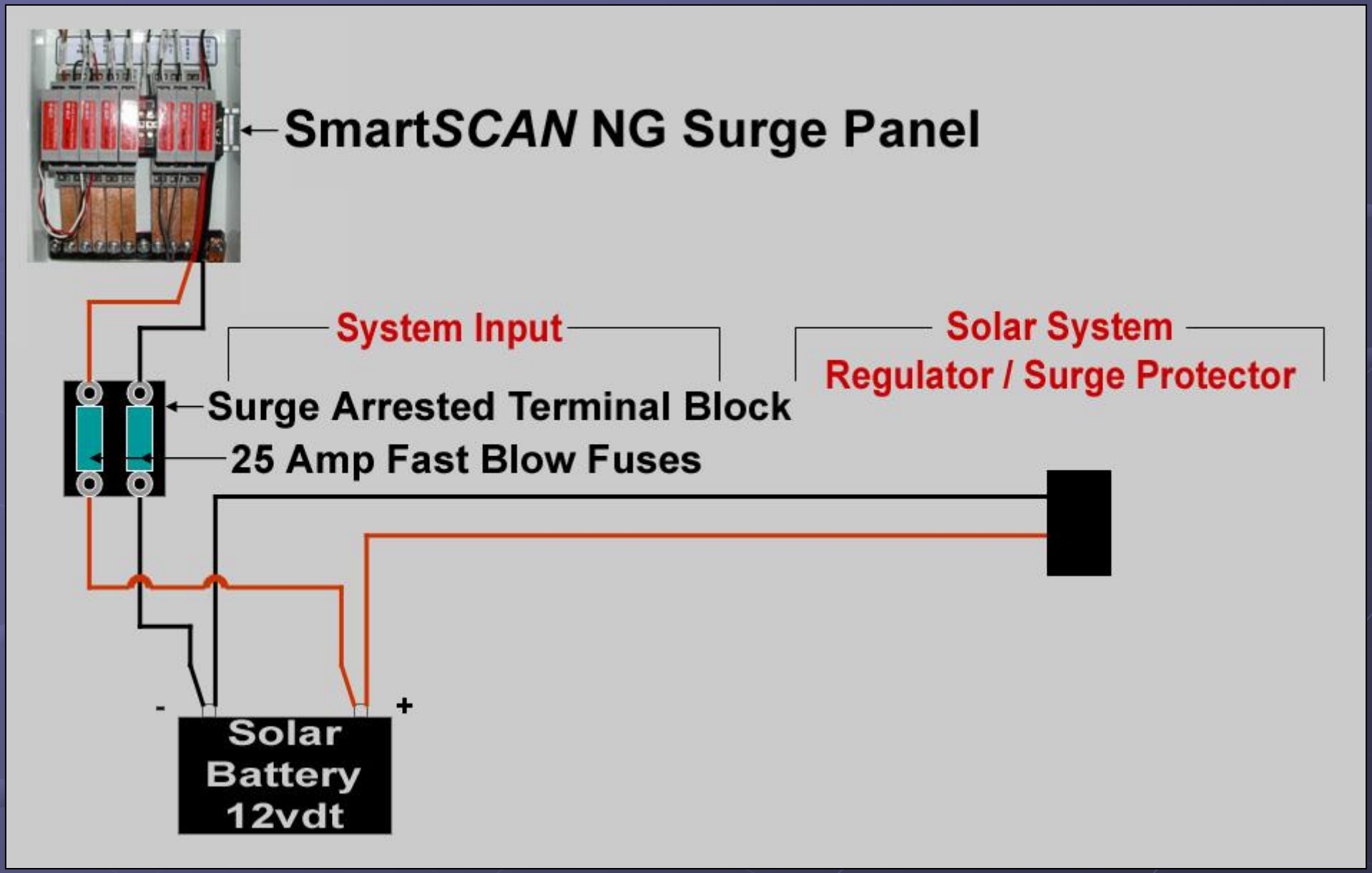
Smart*SCAN* NG – Temperature Probe



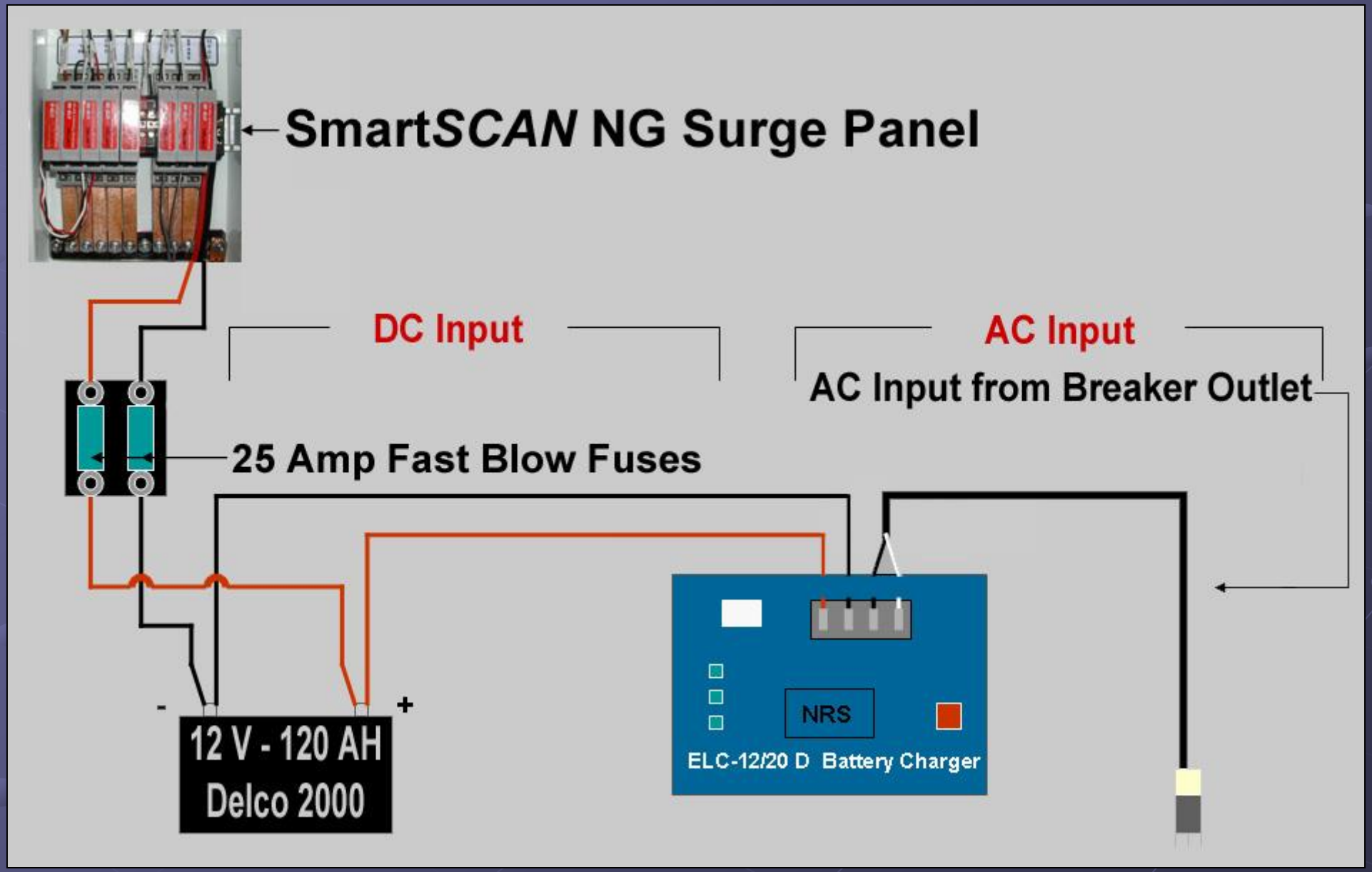
Smart*SCAN* NG – Temperature Probe



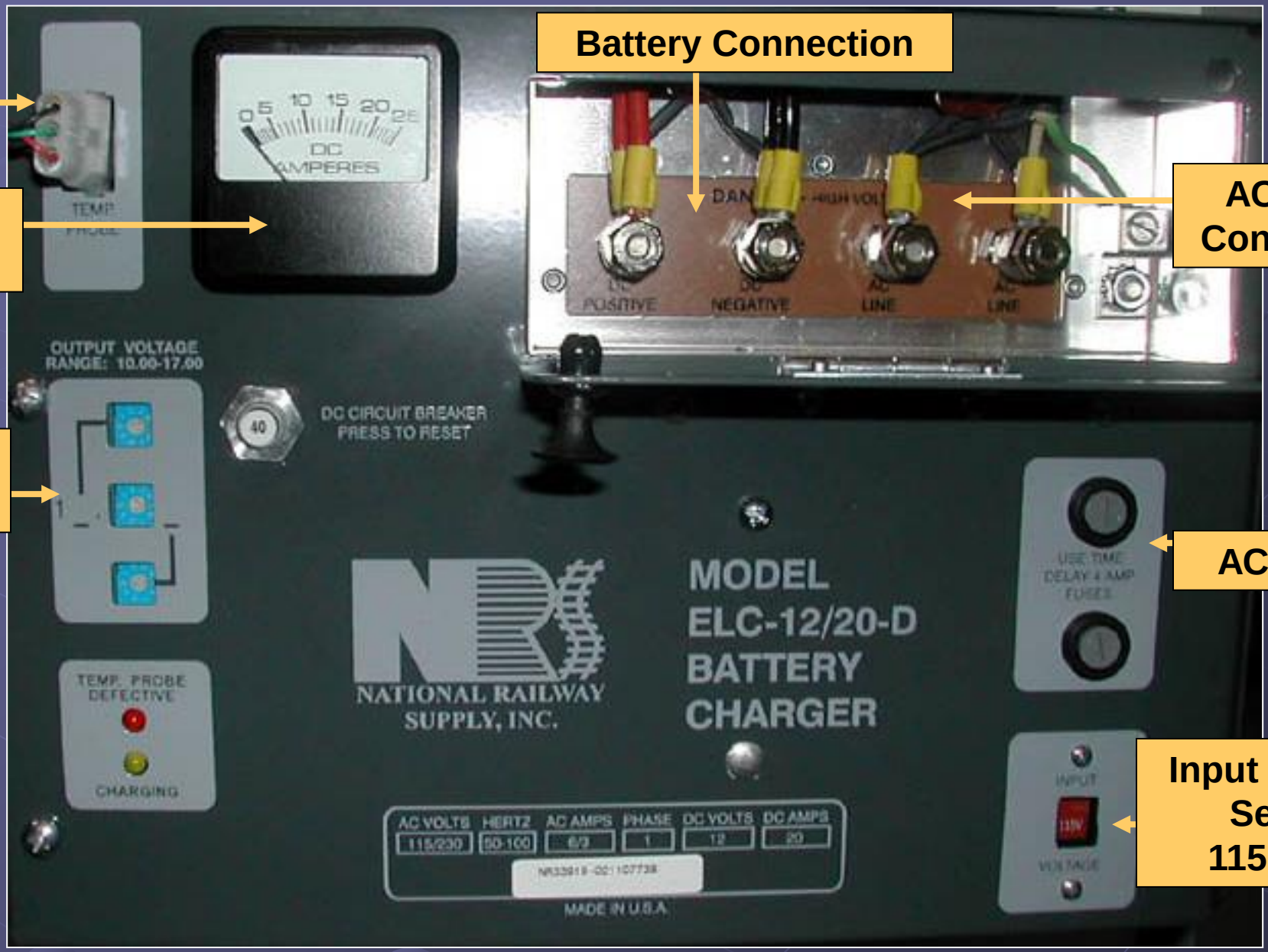
Smart*SCAN* NG – Power Connections



SmartSCAN NG – Power Connections

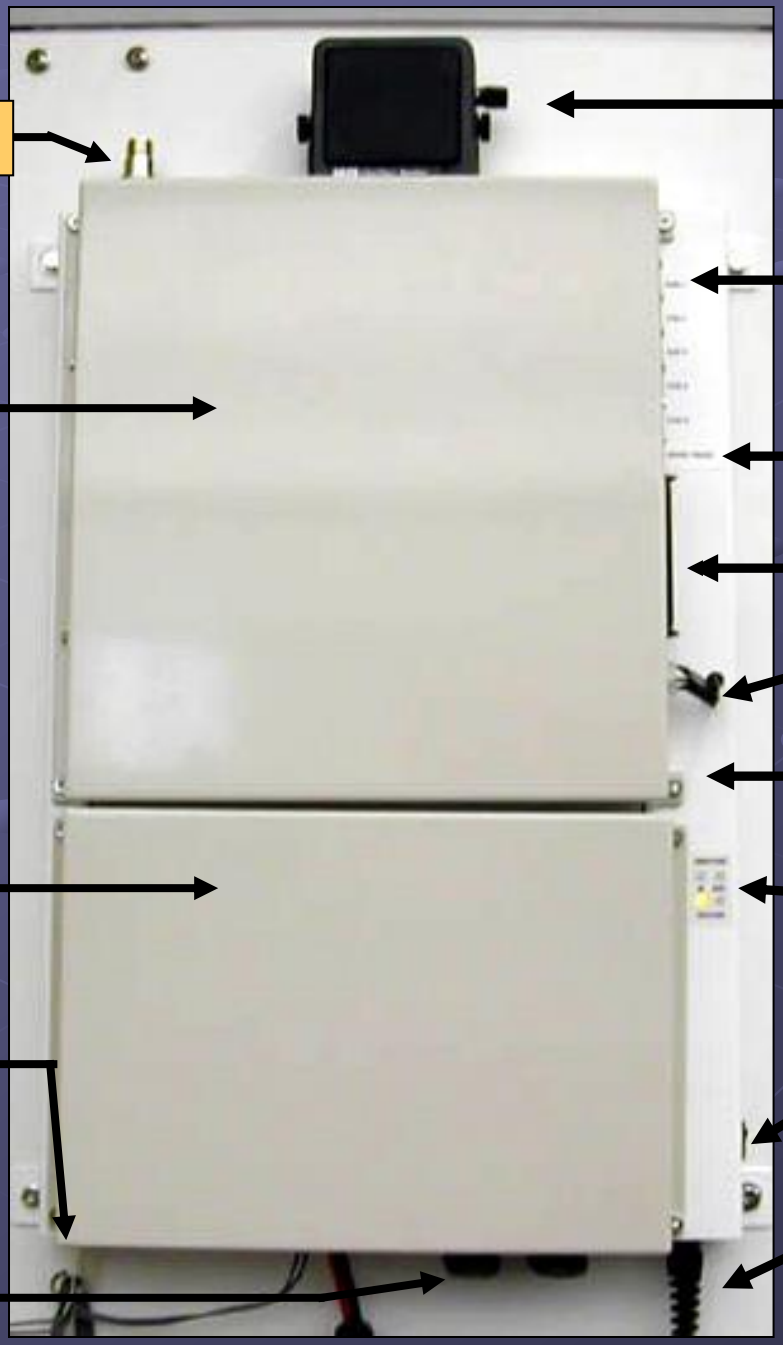


Battery Charger



SYSTEM ELECTRONICS

SmartSCAN NG – System Electronics



Radio Antenna Connector

2300-502 System Interface Module

2300-501 Controller Chassis Assembly

Temperature Probe connection

Scanner Connectors

System Speaker

5 - Comm Ports

1-AEI Port

60 - Pin I/O Connector

Temp Probe - Telephone 12V

Diagnostic LED Panel

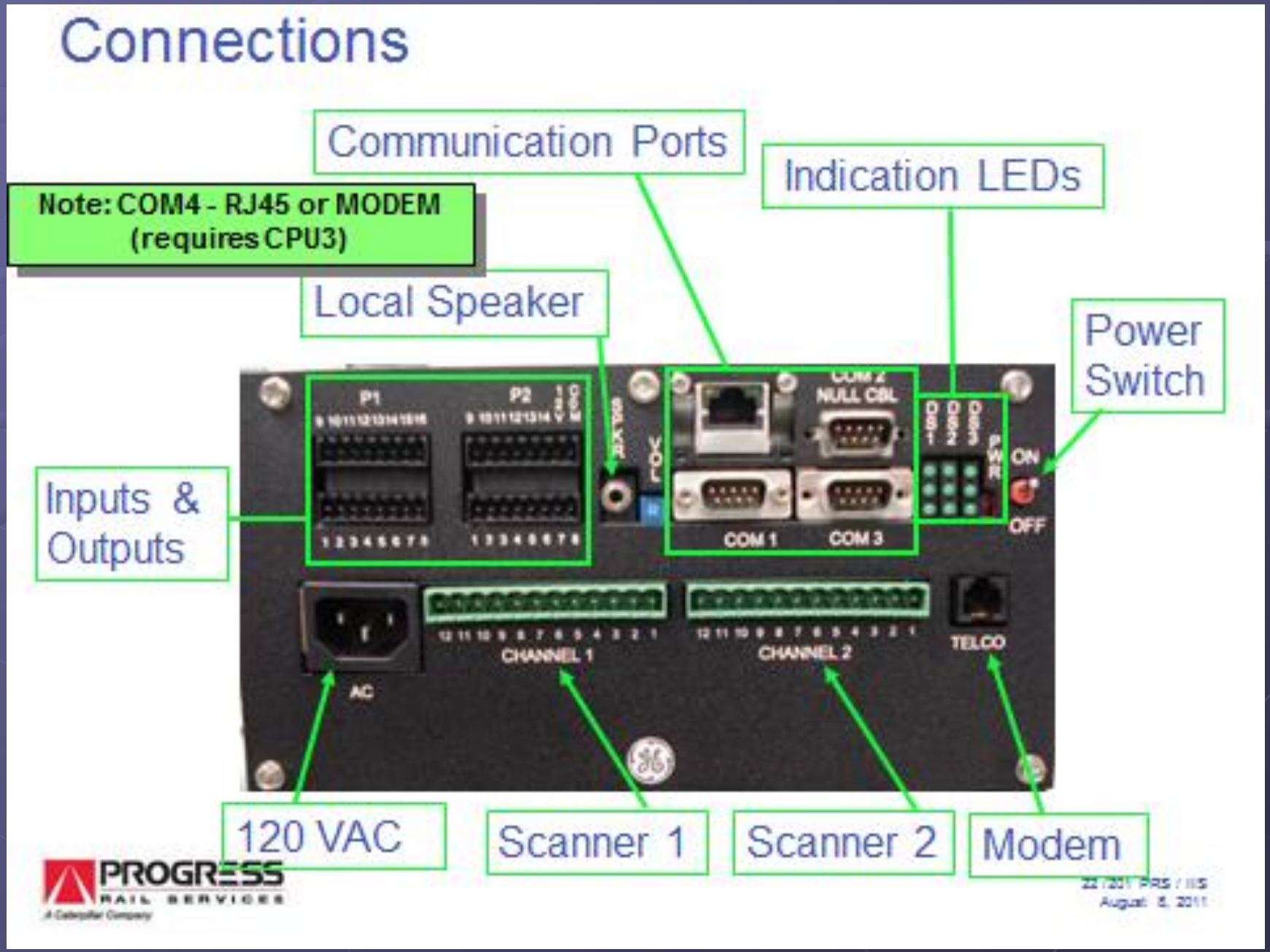
Scanner Indicators Heater & Shutter

System Power Switch

AC Power for Scanner Heaters

Micro – System Electronics

Connections



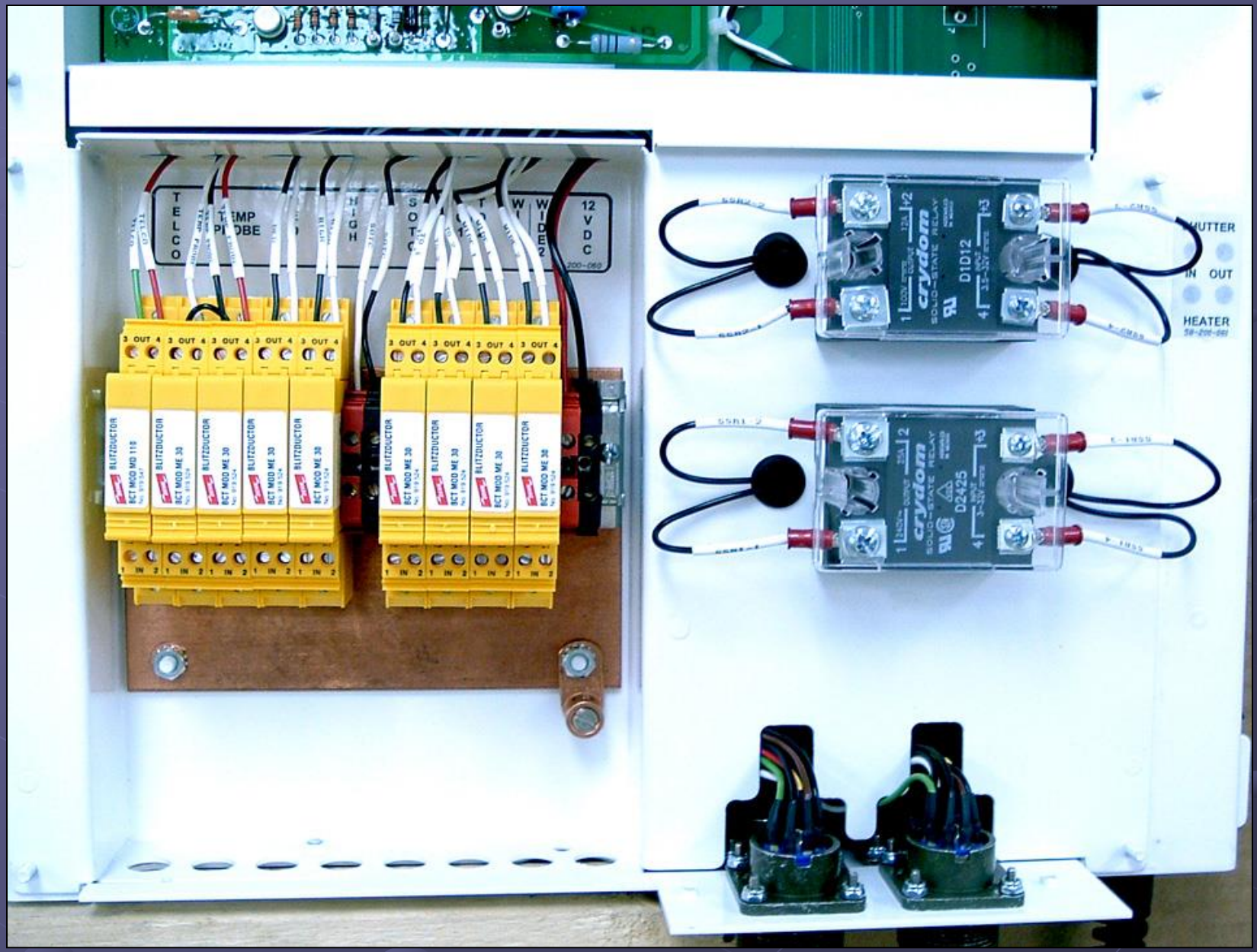
System Speaker

Volume Control

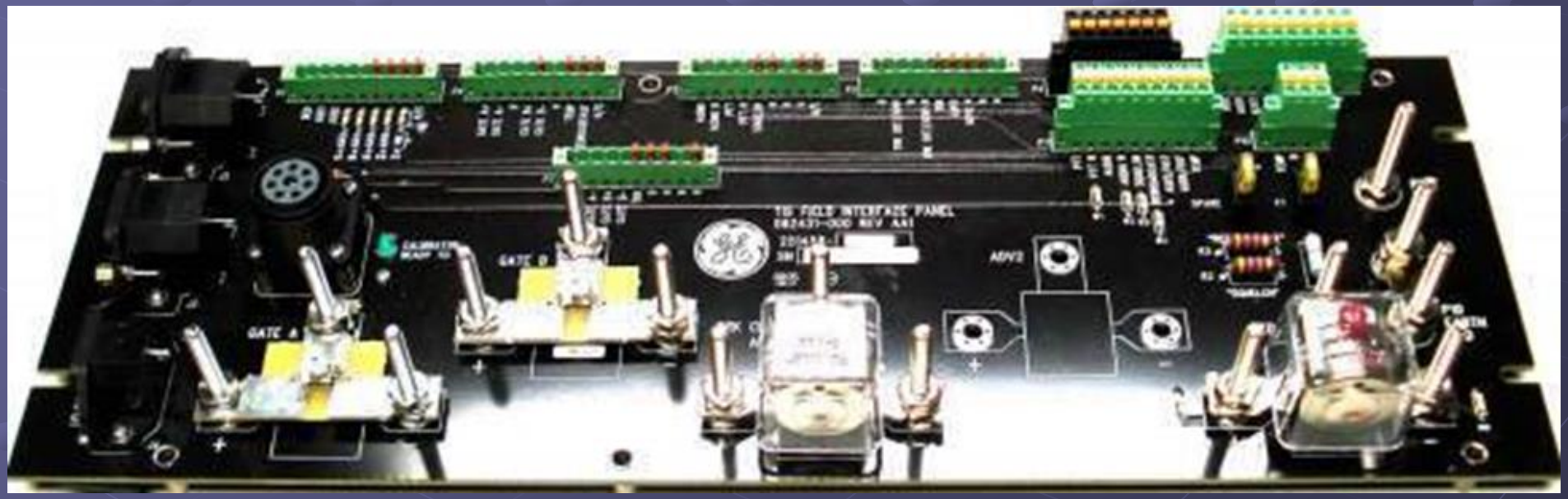
Mounting Knobs - 2

Audio Input

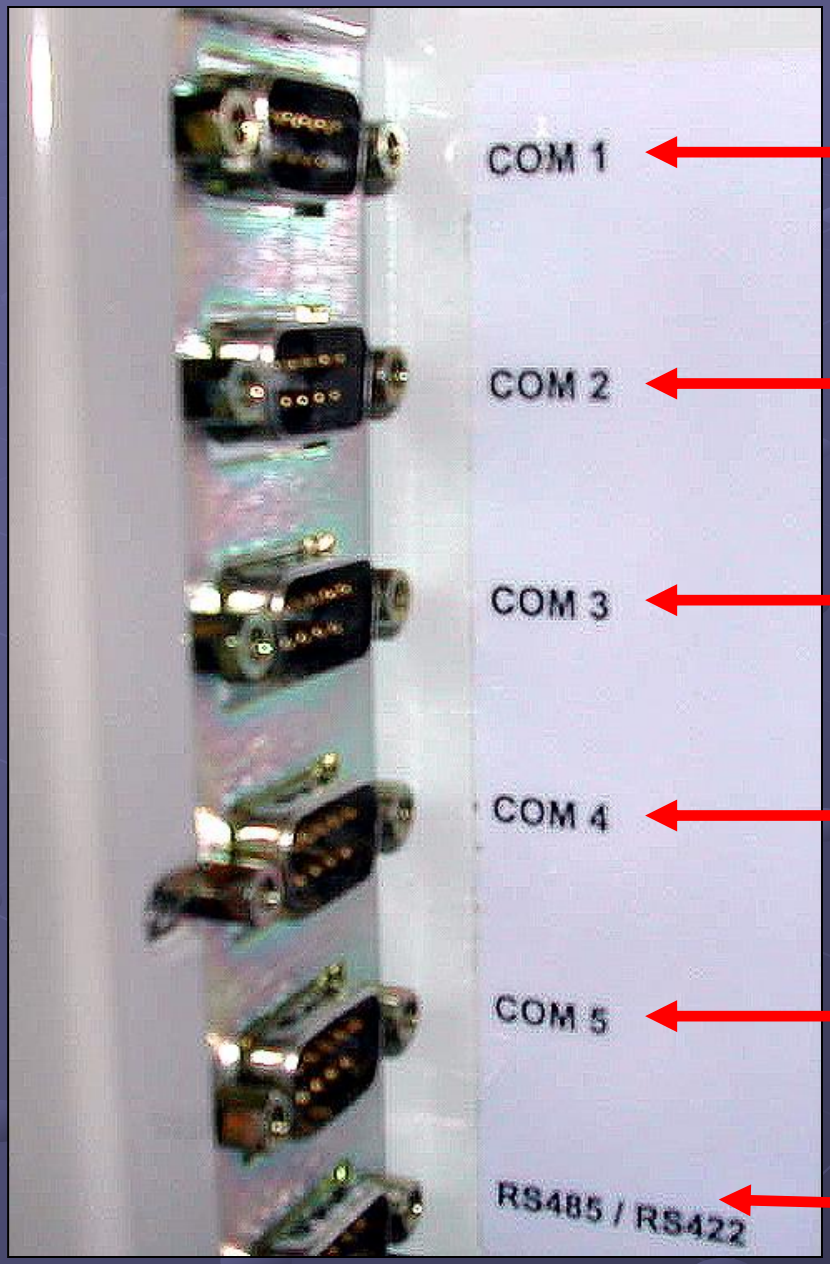
Smart*SCAN* NG – Track Connections



Micro – Track Connections



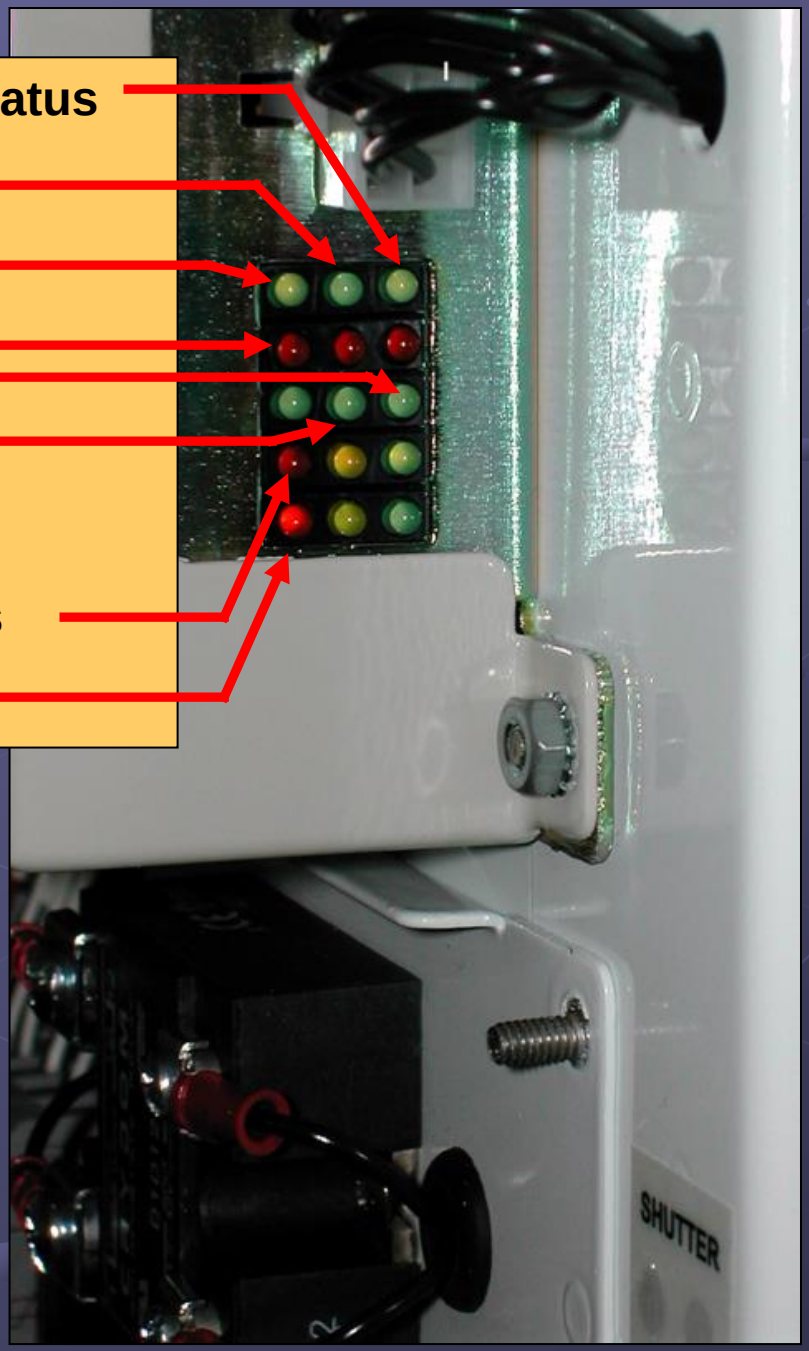
SmartSCAN NG – Communications Ports



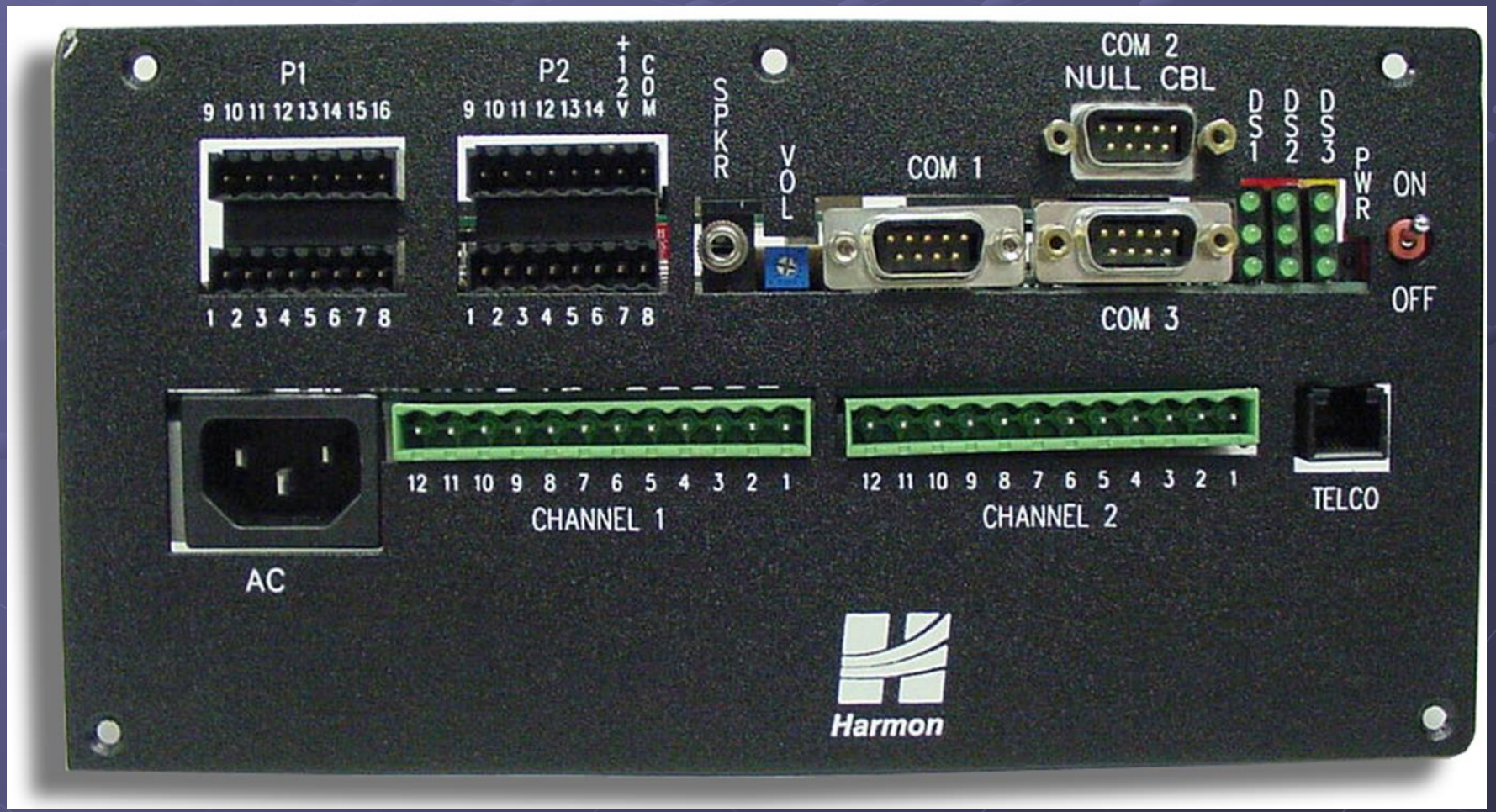
- COM 1 → Laptop Connection
- COM 2 → Serial Connection
- COM 3 → External Modem
- COM 4 → Pass-Through Model
- COM 5 → AEI
- RS485 / RS422 → Unused

SmartSCAN NG – Status Indicators

- Communications Processor Status
- Non-Volatile Battery Status
- Reader Processor Status
- Alarms Stored
- Presence
- Push-to-Talk - PTT
- Transducer Activity and Status
- Scanner Activity & Status



Micro – Comm Ports & Status Indicators

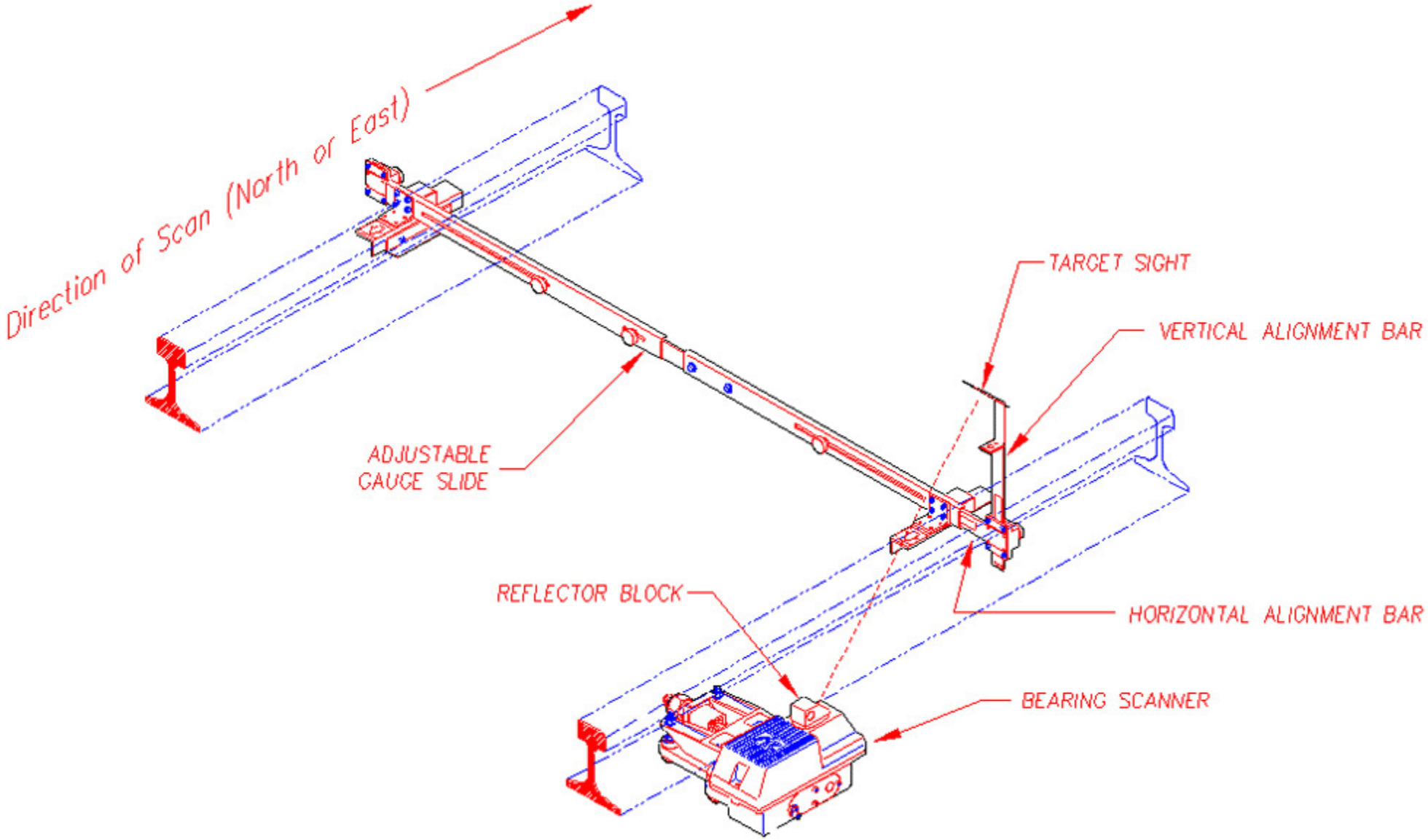


Smart*SCAN* NG System

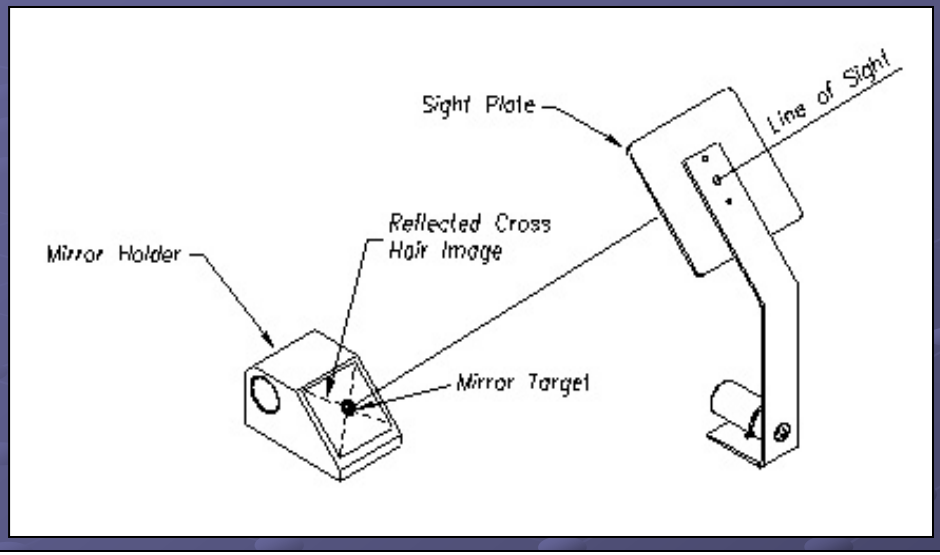
SYSTEM OPERATION

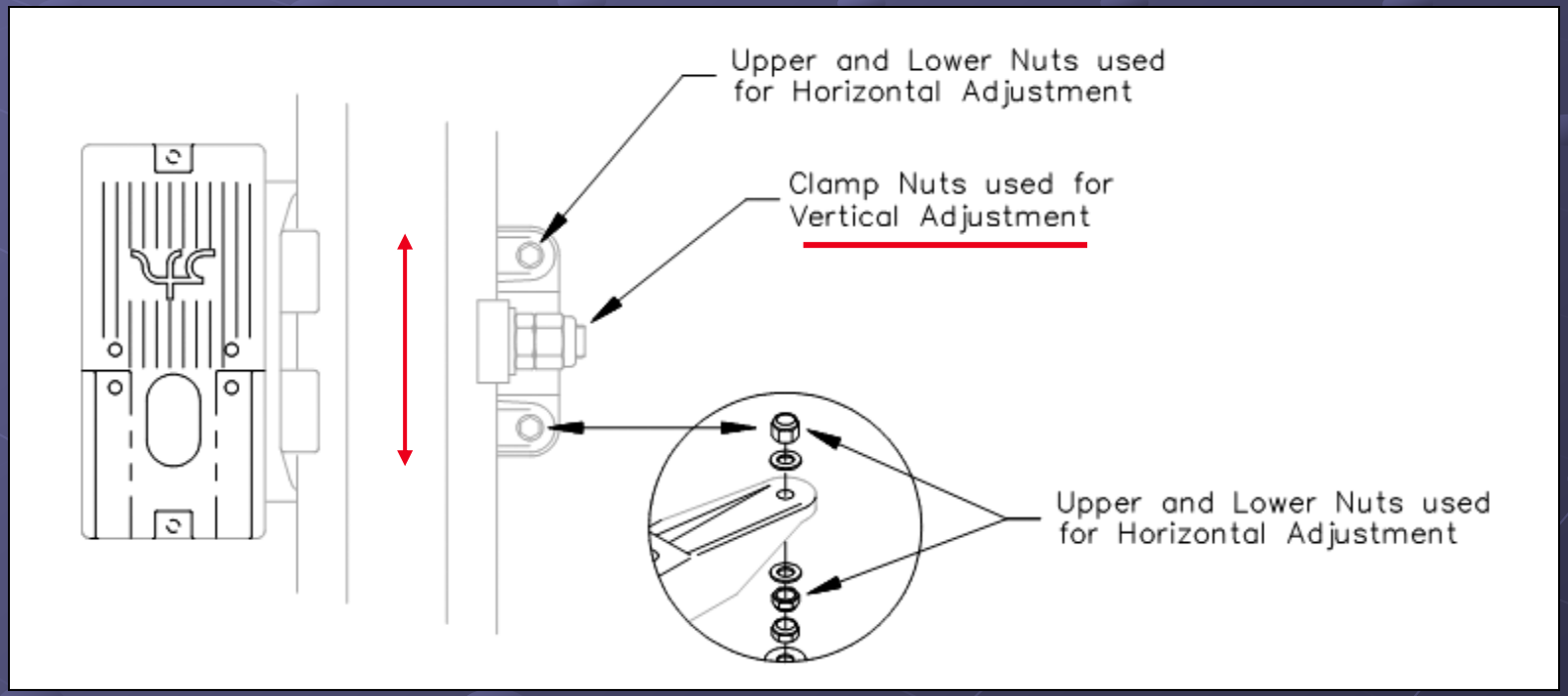
- Set-up
- Alignment
- Calibration

SmartSCAN NG – Scanner Alignment

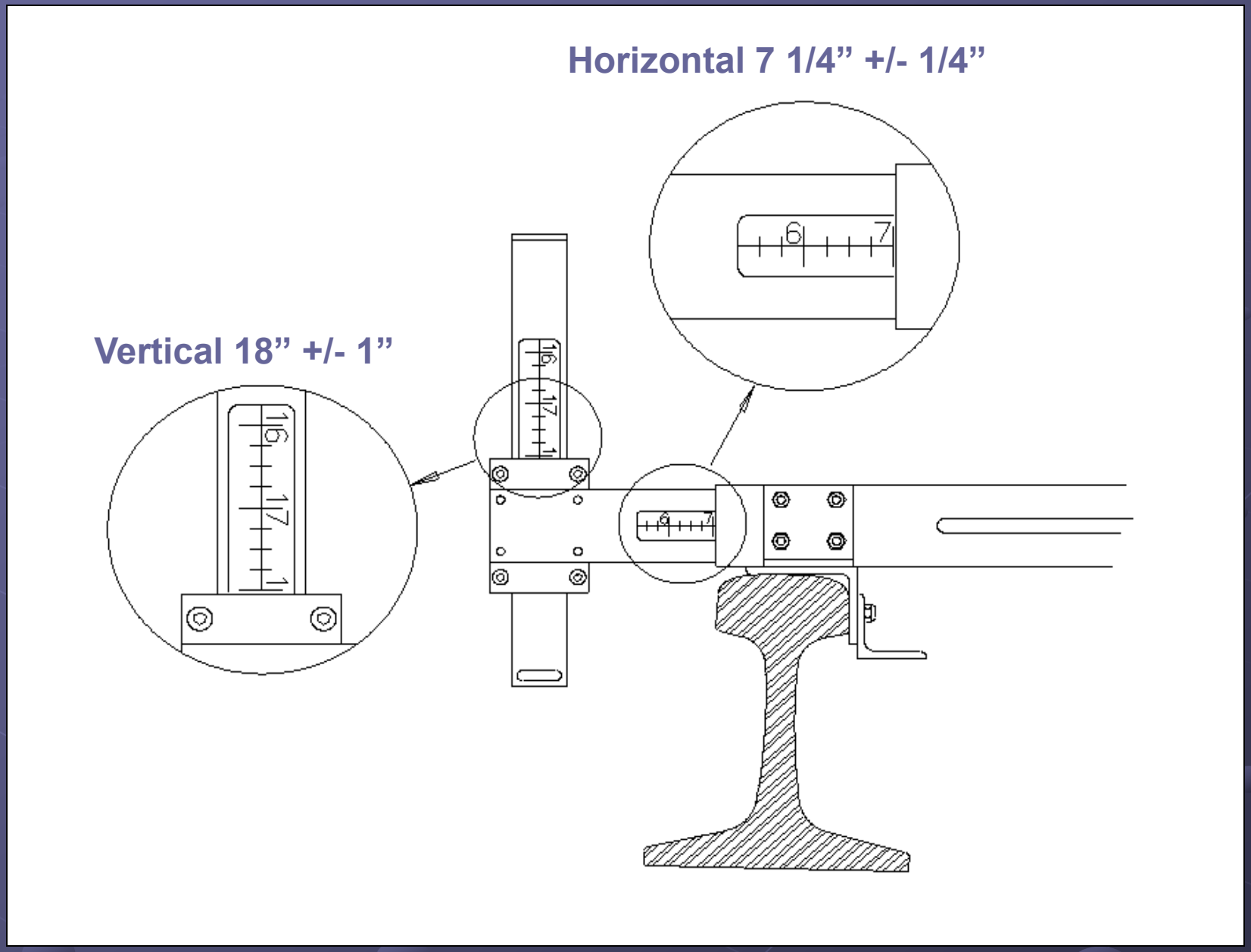


SmartSCAN NG – Scanner Alignment

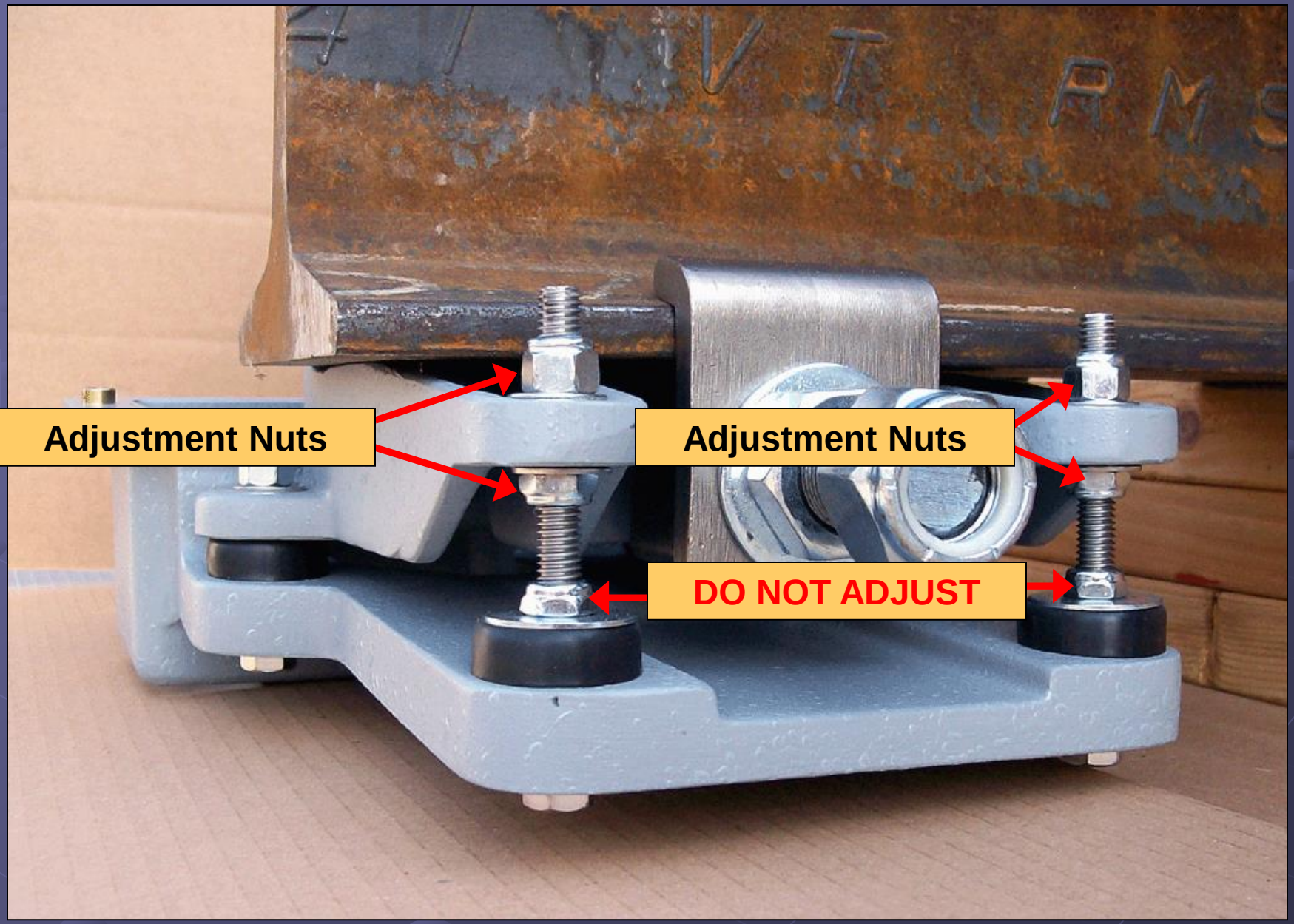




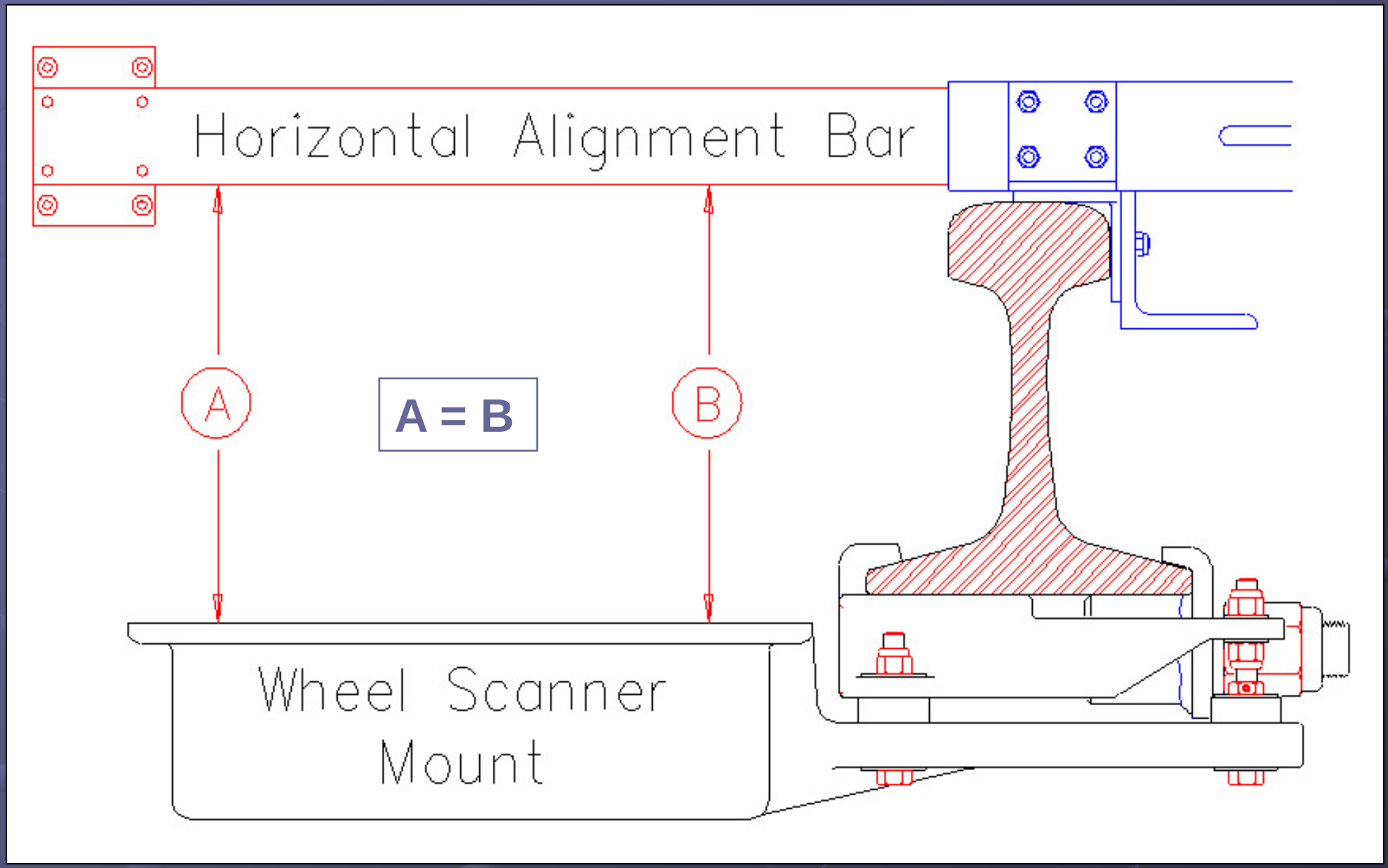
SmartSCAN NG – Alignment Fixture



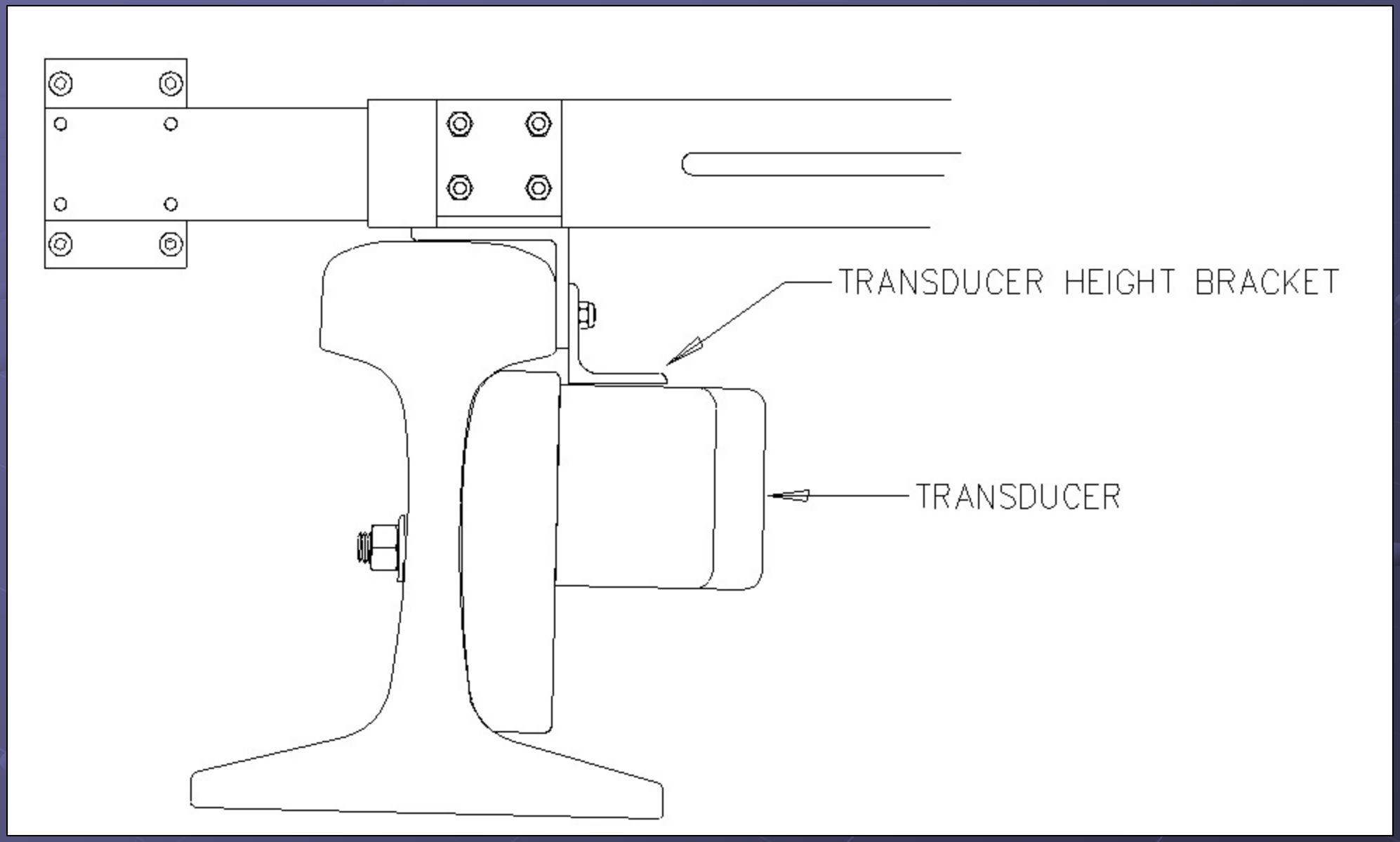
Smart*SCAN* NG – Horizontal Adjustment Nuts



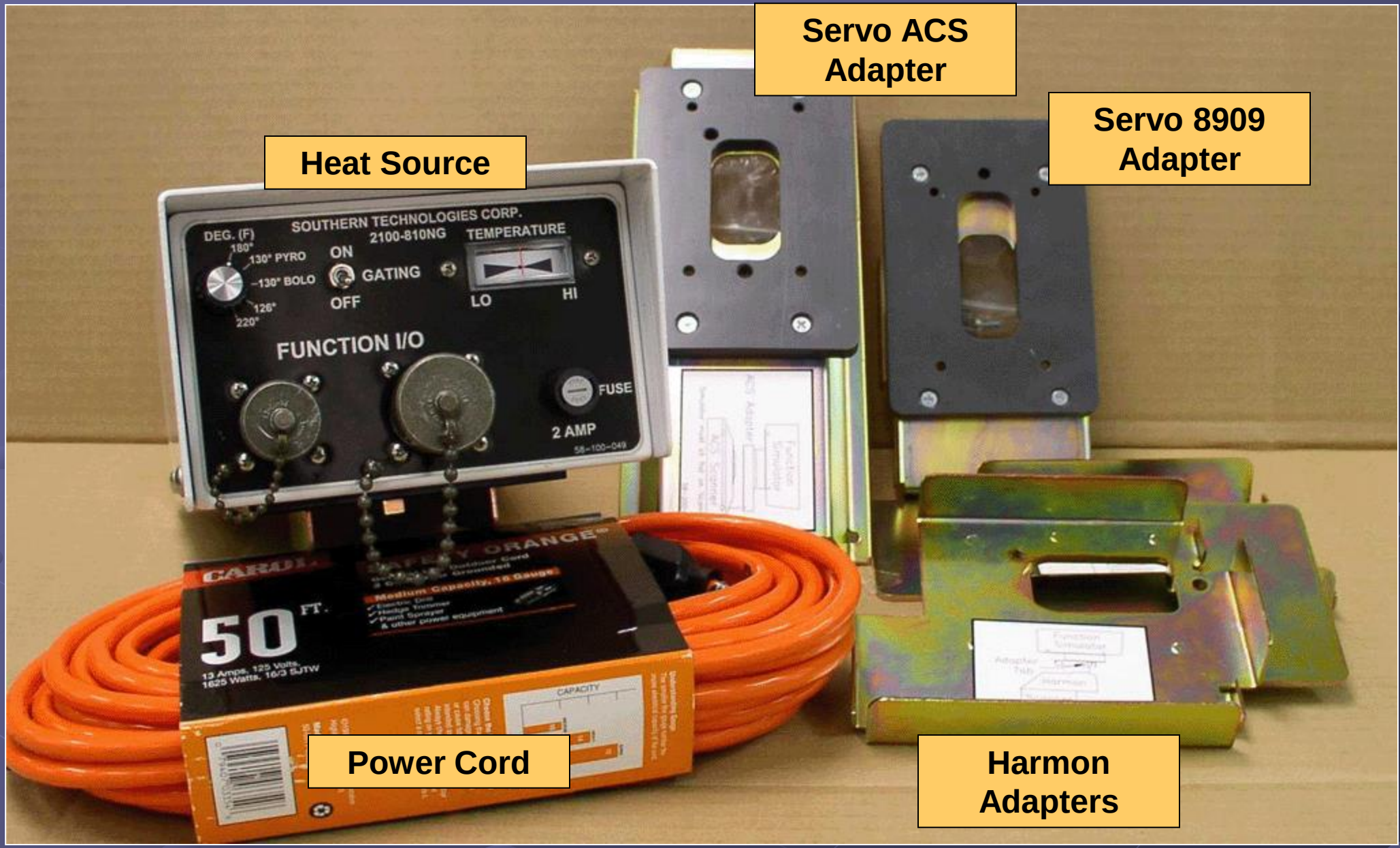
Smart*SCAN* NG – Wheel Scanner Alignment



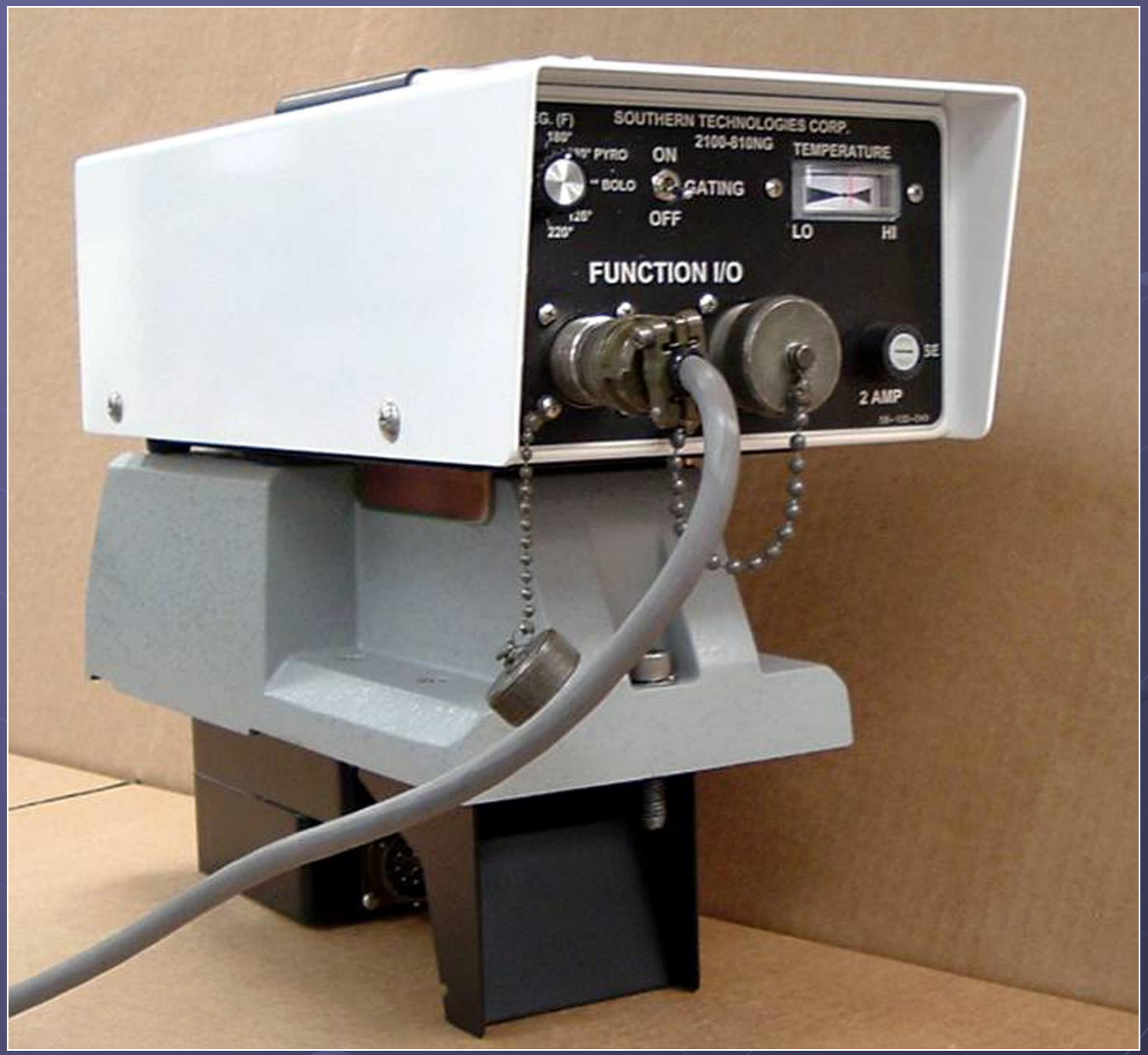
SmartSCAN NG – Transducer Height Adjust



SmartSCAN NG – Calibrated Heat Source



Smart*SCAN* NG – Heat Source



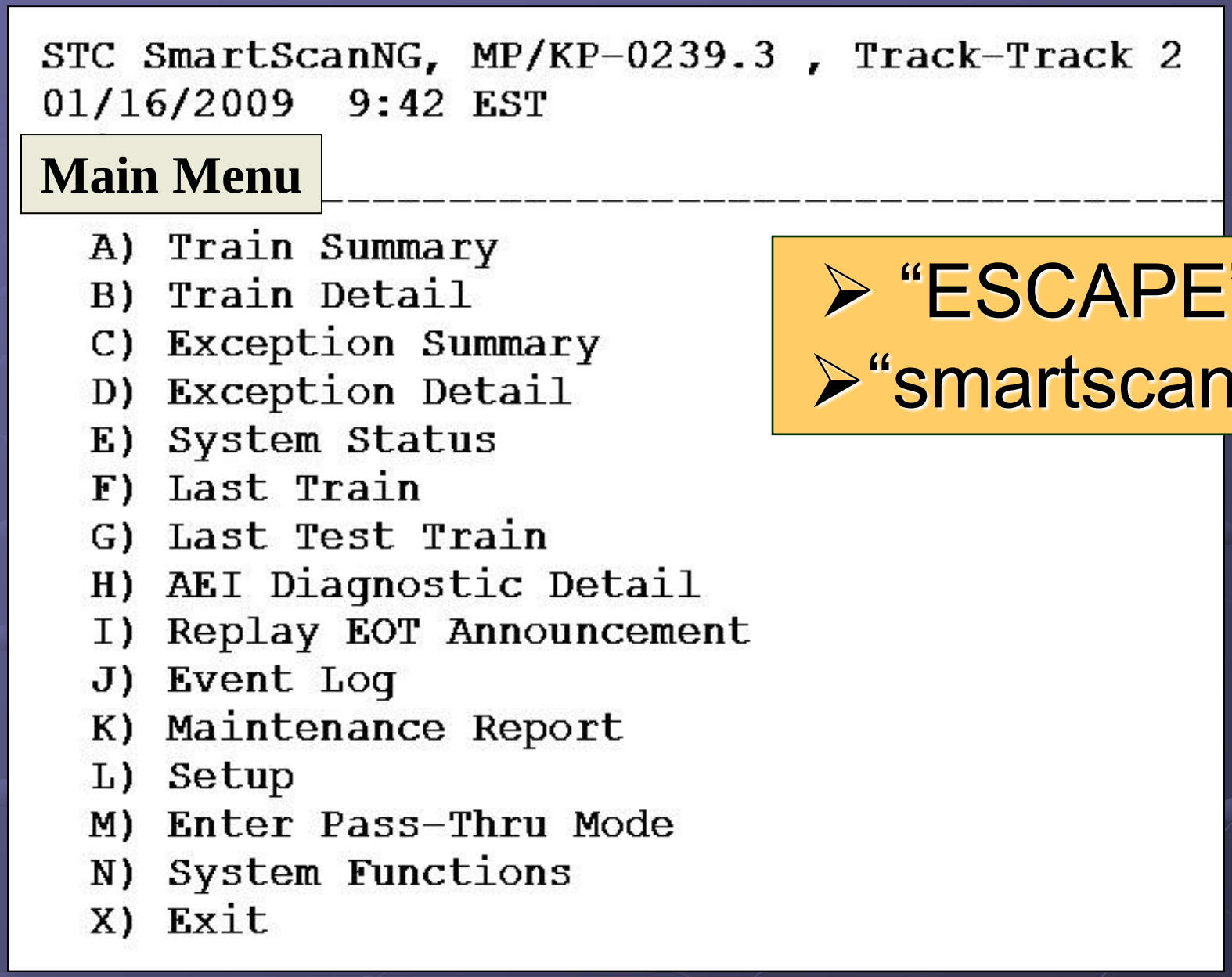
Smart*SCAN* NG – Heat Source

Smart*SCAN* NG – Laptop Communication

Laptop with Terminal Program

Factory Baud Rate NG 19200 8-N-1 with no flow control

SmartSCAN NG – Serial Interface



- "ESCAPE"
- "smartscan"

SmartSCAN NG – Serial Interface

```
Enter "Setup" To Proceed: setup

Retrieving setup from Analyzer.


STC SmartScanNG, MP/KP-0239.3 , Track-Track 2
01/16/2009  9:42 EST
```

Setup Menu

```
  A) Date and Time
  B) MP/KP
  C) Track Number
  D) Alarm Limits
  E) Equipment
  F) Messages
  G) AEI Reader Parameters
  H) DCS Parameters
  I) Load Default Setup Parameters
  J) Setup Password
  K) COM1   Tx   19200 / Rx 19200    N-8-1
  L) COM2   Tx   19200 / Rx 19200    N-8-1
  M) COM3   Tx   19200 / Rx 19200    N-8-1
  N) COM4   Tx   19200 / Rx 19200    N-8-1
  X) Exit
```

SmartSCAN NG – Default Parameters

Alarms:	
Absolute	:195
Differential	:115
Hotwheel	:700
Carside Slope	:1.31
Carside Minimum	:155
Cold Rails	:2
Cold Rail Temp	:10

Equipment:	
Dragging Equipment	:Y
High Load	:N
Wide Load	:N
Carside Slope	:N
Hotwheel	:N
Gate Distance	:24.0
Clearance Type	:Light Beam
Clearance Mode	:Multiplexed
Winter Cycle	:Y
Selected Modem	:Default

Messages:	
Axles	:N
Temperature	:N
Slow Train	:Y
Repeat No Defects	:Y
Railroad Name	:Y
Speed	:N
Length	:N
Power Off	:Y
Cars	:N
Request EOT Timer	:005
Rebroad DTMF Code	:001

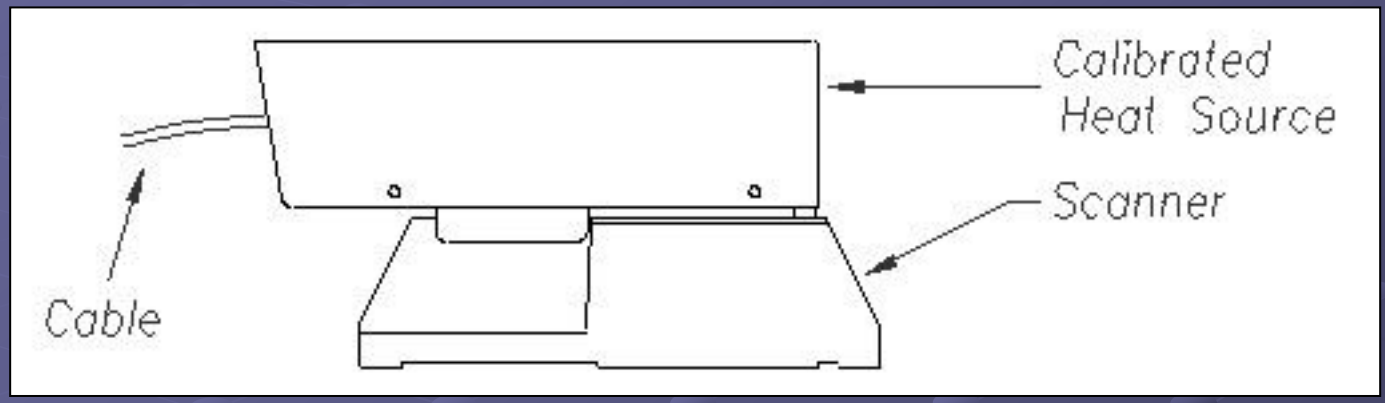
SmartSCAN NG – Serial Interface

```
STC SmartScanNG, MP/KP-0239.3 , Track-Track 2
01/16/2009  9:43 EST
```

System Functions Menu

```
  A) Radio Test
  B) Vocabulary Test
  C) Ramp Function
  D) Radio Inhibit
  E) Manual Test Mode
  F) 1KHz Test Tone
  G) Auto-Calibration
  H) Reset the COP Counters
  I) Remote System RESET
  J) Delete All Stored Train Data
  K) Clear Event Log
  X) Exit
```

SmartSCAN NG – Scanner Calibration




```
STC SmartScanNG, Milepost-1794.5Z, Track:Single
 09/30/2002 21:57
 Main Menu
 ------------------------------

  A) Train Summary
  B) Train Detail
  C) Exception Summary
  D) Exception Detail
  E) System Status
  F) Last Train
  G) Last Ramp Train
  H) Event Log                    - NOT YET AVAILABLE
  I) Replay EOT Announcement
  J) Setup
  K) Enter Pass-Thru Mode         - NOT YET AVAILABLE
  L) System Functions
  X) Exit
 ?
```

```
STC SmartScanNG, Milepost-1794.5Z, Track:Single
 09/30/2002 21:57
 System Functions Menu
 ---------------------------------------------

  A) Radio Test
  B) Vocabulary Test
  C) Ramp Function
  D) Radio Inhibit
  E) System Activation            - NOT YET AVAILABLE
  F) 1KHz Test Tone
  G) Auto-Calibration
  H) Reset the COP Counters
  I) Remote System RESET
  J) Delete All Stored Train Data
  X) Exit
 ?
```

Smart*SCAN* NG System

SYSTEM REPORTING

- Train Summary
- Train Detail
- System Status
- Event Log

SmartSCAN NG – Train Summary

Southern Technologies Corporation
Next Generation Detector System
TRAIN SUMMARY

Version Info.... Analyzer: NSA2.17-G 02/12/08 MP/KP: 0239.3
Communicator: NSA2.17-G 02/19/08 Track: Track 2
Speech: NS1.04

Alarm Limits.. Critical: 200 Carside Slope..... 1.31
Warm: 170 Minimum... 155
Differential: 115 Cold Rail Temp... 10

DCS Transfer Process: Disabled

Train#		Date	Time	Cars	Axles	TO1	TO2	AEI Tags	Speed (MPH)	Dir	Rail Average North	Rail Average South	Amb Temp	Bat
43	A	01/16/09	09:30	17	72	72	72	0	8	W	27	27	+75F	13.3v
42	B	01/16/09	09:24	32	132	132	132	0	50	E	20	18	+75F	13.3v
41	I	01/16/09	09:16	16	66	66	66	0	8	E	27	27	+74F	13.3v
40		01/16/09	09:09	26	106	106	106	0	30	W	24	24	+75F	13.3v
39		01/16/09	09:01	144	584	584	584	0	72	E	22	22	+74F	13.3v

SmartSCAN NG – Train Summary

Southern Technologies Corporation
Next Generation Detector System
TRAIN SUMMARY

Version Info.... Analyzer: NSA2.17-G 02/12/08 MP/KP: 0239.3
Communicator: NSA2.17-G 02/19/08 Track: Track 2
Speech: NS1.04

Alarm Limits.. Critical: 200 Carside Slope..... 1.31
Warm: 170 Minimum... 155
Differential: 115 Cold Rail Temp... 10

DCS Transfer Process: Disabled

Train#	Date	Time	Cars	Axles	TO1	TO2	AEI Tags	Speed (MPH)	Dir	Rail Average North	Rail Average South	Amb Temp	Bat
43 A	01/16/09	09:30	17	72	72	72	0	8	W	27	27	+75F	13.3v
42 B	01/16/09	09:24	32	132	132	132	0	50	E	20	18	+75F	13.3v
41 I	01/16/09	09:16	16	66	66	66	0	8	E	27	27	+74F	13.3v
40	01/16/09	09:09	26	106	106	106	0	30	W	24	24	+75F	13.3v
39	01/16/09	09:01	144	584	584	584	0	72	E	22	22	+74F	13.3v

SmartSCAN NG – Train Summary

Southern Technologies Corporation
Next Generation Detector System
TRAIN SUMMARY

Version Info.... Analyzer: NSA2.17-G 02/12/08 MP/KP: 0239.3
Communicator: NSA2.17-G 02/19/08 Track: Track 2
Speech: NS1.04

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42	B	01/16/09	09:24	32	132	132	132	0	50	E	20	18	+75F	13.3v
41	I	01/16/09	09:16	16	66	66	66	0	8	E	27	27	+74F	13.3v
40		01/16/09	09:09	26	106	106	106	0	30	W	24	24	+75F	13.3v
39		01/16/09	09:01	144	584	584	584	0	72	E	22	22	+74F	13.3v

SmartSCAN NG – Train Summary

Southern Technologies Corporation
Next Generation Detector System
TRAIN SUMMARY

Version Info.... Analyzer: NSA2.17-G 02/12/08 MP/KP: 0239.3
Communicator: NSA2.17-G 02/19/08 Track: Track 2
Speech: NS1.04

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42	B	01/16/09	09:24	32	132	132	132	0	50	E	20	18	+75F	13.3v
41	I	01/16/09	09:16	16	66	66	66	0	8	E	27	27	+74F	13.3v
40		01/16/09	09:09	26	106	106	106	0	30	W	24	24	+75F	13.3v
39		01/16/09	09:01	144	584	584	584	0	72	E	22	22	+74F	13.3v

SmartSCAN NG – Train Summary

Southern Technologies Corporation
Next Generation Detector System
TRAIN SUMMARY

Version Info.... Analyzer: NSA2.17-G 02/12/08 MP/KP: 0239.3
Communicator: NSA2.17-G 02/19/08 Track: Track 2
Speech: NS1.04

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43	A	01/16/09	09:30	17	72	72	72	0	8	W	27	27	+75F	13.3v
42	B	01/16/09	09:24	32	132	132	132	0	50	E	20	18	+75F	13.3v
41	I	01/16/09	09:16	16	66	66	66	0	8	E	27	27	+74F	13.3v
40		01/16/09	09:09	26	106	106	106	0	30	W	24	24	+75F	13.3v
39		01/16/09	09:01	144	584	584	584	0	72	E	22	22	+74F	13.3v

SmartSCAN NG – Train Summary

Southern Technologies Corporation
Next Generation Detector System
TRAIN SUMMARY

Version Info.... Analyzer: NSA2.17-G 02/12/08 MP/KP: 0239.3
Communicator: NSA2.17-G 02/19/08 Track: Track 2
Speech: NS1.04

Alarm Limits.. Critical: 200 Carside Slope..... 1.31
Warm: 170 Minimum... 155
Differential: 115 Cold Rail Temp... 10

DCS Transfer Process: Disabled

Train#	Date	Time	Cars	Axles	TO1	TO2	AEI Tags	Speed (MPH)	Dir	Rail Average North	Rail Average South	Amb Temp	Bat
43 A	01/16/09	09:30	17	72	72	72	0	8	W	27	27	+75F	13.3v
42 B	01/16/09	09:24	32	132	132	132	0	50	E	20	18	+75F	13.3v
41 I	01/16/09	09:16	16	66	66	66	0	8	E	27	27	+74F	13.3v
40	01/16/09	09:09	26	106	106	106	0	30	W	24	24	+75F	13.3v
39	01/16/09	09:01	144	584	584	584	0	72	E	22	22	+74F	13.3v

SmartSCAN NG – Train Detail Report

Southern Technologies Corporation
Next Generation Detector System
TRAIN DETAIL

Train#:	43	Speed:	8MPH	MP/KP:	0239.3
Date:	01/16/09	Axles:	72	Track:	Track2
Time:	09:30	Direction:	West	Temperature:	+ 75F
Length:	1387	Shutters Open:	129	Battery:	13.3v

Rail	Max	Avg	Resistor Read	Resistor Req	CF	Txdr Counts		Alarm	Limit	Carside Parms	
North	28	27	300	263B	0	TO1	72	Critical	200	Slope:	1.31
South	27	27	296	267B	0	TO2	72	Warm	170	Minimum:	155
								Differential	115		
								Hot Wheel	702		
Resistor Test Mode: Enabled								Cold Rail Temp	10		

Firmware Versions

Analyzer: NSA2.17-G 02/12/08 Comm: NSA2.17-G 02/19/08 Speech: NS1.04

System Alarms

Axle Alarm Summary

NONE

SmartSCAN NG – Train Detail Report

Southern Technologies Corporation
Next Generation Detector System
TRAIN DETAIL

Train#:	43	Speed:	8MPH	MP/KP:	0239.3
Date:	01/16/09	Axles:	72	Track:	Track2
Time:	09:30	Direction:	West	Temperature:	+ 75F
Length:	1387	Shutters Open:	129	Battery:	13.3v

Rail	Max	Avg	Resistor Read	Resistor Req	Resistor CF
North	28	27	300	263B	0
South	27	27	296	267B	0

Txdr Counts		Alarm	Limit	Carside Parms	
TO1	72	Critical	200	Slope:	1.31
TO2	72	Warm	170	Minimum:	155
		Differential	115		
		Hot Wheel	702		
		Cold Rail Temp	10		

Resistor Test Mode: Enabled

Firmware Versions

Analyzer: NSA2.17-G 02/12/08 Comm: NSA2.17-G 02/19/08 Speech: NS1.04

System Alarms

Axle Alarm Summary

NONE

SmartSCAN NG – Train Detail Report

Southern Technologies Corporation
Next Generation Detector System
TRAIN DETAIL

Train#:	43			Speed:	8MPH			MP/KP:	0239.3		
Date:	01/16/09			Axles:	72			Track:	Track2		
Time:	09:30			Direction:	West			Temperature:	+ 75F		
Length:	1387			Shutters Open:	129			Battery:	13.3v		

Rail	Max	Avg	Resistor Read	Resistor Req	Resistor CF	Txdr Counts		Alarm	Limit	Carside Parms	
North	28	27	300	263B	0	TO1	72	Critical	200	Slope:	1.31
South	27	27	296	267B	0	TO2	72	Warm	170	Minimum:	155
								Differential	115		
								Hot Wheel	702		
Resistor Test Mode: Enabled								Cold Rail Temp	10		

Firmware Versions

Analyzer: NSA2.17-G 02/12/08 Comm: NSA2.17-G 02/19/08 Speech: NS1.04

System Alarms

Axle Alarm Summary

NONE

Smart*SCAN* NG – Train Detail Report

```
            Southern Technologies Corporation
           Next Generation Detector System
                     TRAIN DETAIL
===============================================================================
Train#:  43              Speed:   8MPH                MP/KP:0239.3
  Date: 01/16/09         Axles:  72                   Track: Track2
  Time: 09:30        Direction: West            Temperature: + 75F
Length:  1387    Shutters Open:  129                Battery: 13.3v
===============================================================================
                 Resistor
Rail   Max  Avg  Read  Req   CF   Txdr Counts  Alarm        Limit   Carside Parms
-----------------------------   -----------  ------------------   -------------
North   28   27   300  263B  0      TO1   72   Critical      200     Slope: 1.31
South   27   27   296  267B  0      TO2   72   Warm          170   Minimum: 155
                                               Differential  115
                                               Hot Wheel     702
Resistor Test Mode: Enabled                  Cold Rail Temp   10
===============================================================================
Firmware Versions
-----------------
Analyzer: NSA2.17-G 02/12/08   Comm: NSA2.17-G 02/19/08   Speech: NS1.04
-------------------------------------------------------------------------------


System Alarms
----------------------------------------


Axle Alarm Summary
-------------------------------------------------------------------------------
NONE
```

SmartSCAN NG – Train Detail Report

Southern Technologies Corporation
Next Generation Detector System
TRAIN DETAIL

Train#:	43			Speed:	8MPH			MP/KP:	0239.3		
Date:	01/16/09			Axles:	72			Track:	Track2		
Time:	09:30			Direction:	West			Temperature:	+ 75F		
Length:	1387			Shutters Open:	129			Battery:	13.3v		

Rail	Max	Avg	Resistor Read	Resistor Req	CF	Txdr Counts		Alarm	Limit	Carside Parms	
North	28	27	300	263B	0	TO1	72	Critical	200	Slope:	1.31
South	27	27	296	267B	0	TO2	72	Warm	170	Minimum:	155
								Differential	115		
								Hot Wheel	702		
Resistor Test Mode: Enabled								Cold Rail Temp	10		

Firmware Versions

Analyzer: NSA2.17-G 02/12/08 Comm: NSA2.17-G 02/19/08 Speech: NS1.04

System Alarms

Axle Alarm Summary

NONE

SmartSCAN NG – Train Detail Report

Car	Axle	Trk	North	South	ON	OFF	PW1	PW2	Alarms
1	1	0	28	27	170	0	11	10	
	2	0	28	27	170	422	11	10	
	3	0	28	27	170	411	11	11	
	4	1	27	27	170	4199	11	11	
	5	1	28	27	170	411	11	11	
	6	1	27	27	170	411	11	11	
2	7	2	27	27	170	1178	11	11	
	8	2	27	27	170	422	11	10	
	9	2	27	27	170	411	11	11	
	10	3	27	27	170	4198	11	10	
	11	3	27	27	170	411	11	11	
	12	3	27	27	170	411	11	11	
3	13	4	27	27	170	1178	11	11	
	14	4	27	27	170	422	11	11	
	15	5	28	27	170	4199	11	11	
	16	5	27	27	170	411	11	11	

SmartSCAN NG – Train Detail Report

Car	Axle	Trk	North	South	ON	OFF	PW1	PW2	Alarms
1	1	0	28	27	170	0	11	10	
	2	0	28	27	170	422	11	10	
	3	0	28	27	170	411	11	11	
	4	1	27	27	170	4199	11	11	
	5	1	28	27	170	411	11	11	
	6	1	27	27	170	411	11	11	
2	7	2	27	27	170	1178	11	11	
	8	2	27	27	170	422	11	10	
	9	2	27	27	170	411	11	11	
	10	3	27	27	170	4198	11	10	
	11	3	27	27	170	411	11	11	
	12	3	27	27	170	411	11	11	
3	13	4	27	27	170	1178	11	11	
	14	4	27	27	170	422	11	11	
	15	5	28	27	170	4199	11	11	
	16	5	27	27	170	411	11	11	

SmartSCAN NG – Train Detail Report

Car	Axle	Trk	North	South	ON	OFF	PW1	PW2	Alarms
1	1	0	28	27	170	0	11	10	
	2	0	28	27	170	422	11	10	
	3	0	28	27	170	411	11	11	
	4	1	27	27	170	4199	11	11	
	5	1	28	27	170	411	11	11	
	6	1	27	27	170	411	11	11	
2	7	2	27	27	170	1178	11	11	
	8	2	27	27	170	422	11	10	
	9	2	27	27	170	411	11	11	
	10	3	27	27	170	4198	11	10	
	11	3	27	27	170	411	11	11	
	12	3	27	27	170	411	11	11	
3	13	4	27	27	170	1178	11	11	
	14	4	27	27	170	422	11	11	
	15	5	28	27	170	4199	11	11	
	16	5	27	27	170	411	11	11	

SmartSCAN NG – System Status Report

Southern Technologies Corporation
Next Generation Detector System
SYSTEM STATUS REPORT

Date:01/16/09 Time:09:41 Battery: 13.7v Ambient Temp.: +75F

Time Zone... Eastern Daylight Savings Time..... Enabled
MP/KP..... 0239.3 Track Dir... E/W Track..... Track 2

Alarm Settings

Critical	200	Warm	170
Differential	115	Hot Wheel	702
Carside Slope	1.31	Carside Minimum	155
Cold Rails	2	Cold Rail Temp	10
Cold Res Counter	3		

Equipment

Dragger	YES	High Load	NO
Wide Load	NO	Carside Slope	NO
Hot Wheel	NO	Clearance Type	Light Beam
Clearance Mode	Multiplexed	Winter Cycle	YES
Transducer Gain	Normal	AEI	NO
Resistor Test	Enabled	Gate Distance	24.0 inches
Dragger Debounce Time	100 ms	Selected Modem	Default

SmartSCAN NG – System Status Report

Southern Technologies Corporation
Next Generation Detector System
SYSTEM STATUS REPORT

Date:01/16/09 Time:09:41 Battery: 13.7v Ambient Temp.: +75F

Time Zone... Eastern Daylight Savings Time..... Enabled
MP/KP..... 0239.3 Track Dir... E/W Track..... Track 2

Alarm Settings

Critical	200	Warm	170
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Dragger Debounce Time	100 ms	Selected Modem	Default

SmartSCAN NG – System Status Report

Southern Technologies Corporation
Next Generation Detector System
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MP/KP..... 0239.3 Track Dir... E/W Track..... Track 2

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SmartSCAN NG – System Status Report

Southern Technologies Corporation
Next Generation Detector System
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MP/KP..... 0239.3 Track Dir... E/W Track..... Track 2

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Clearance Mode	Multiplexed	Winter Cycle	YES
Transducer Gain	Normal	AEI	NO
Resistor Test	Enabled	Gate Distance	24.0 inches
Dragger Debounce Time	100 ms	Selected Modem	Default

SmartSCAN NG – System Status Report

```
Modem Setup Commands
-------------------------------------------
Modem Setup Line 1 = +++
Modem Setup Line 2 = AT&F
Modem Setup Line 3 = AT &D0 &E1 &E15 S0=1 V0
Modem Setup Line 4 = AT E0 X4 &C4 $SB19200
Modem Setup Line 5 = AT &W0
```

```
Messages
-------------------------------------------------------------------------------
Axles.......................... NO      Speed.......................... NO
Temperature.................... NO      Length......................... NO
Slow........................... YES     Power Off...................... YES
Repeat No Defects.............. YES     Cars Count..................... NO
Customer Name.................. YES     Arrival Message................ NO
Lft/Rt Alarm Ref............... NO      Car ID With Alarm.............. NO
Request EOT Timer..............  5      Rebroad DTMF Code.............. 001
Announce Cold Rail............. YES

Scanner Calibration Date
-------------------------------------------------------------------------------
Rail1..........01/15/2009 15:10:48     Rail2..........01/15/2009 15:12:51
```

SmartSCAN NG – System Status Report

```
Modem Setup Commands
----------------------------------------
Modem Setup Line 1 = +++
Modem Setup Line 2 = AT&F
Modem Setup Line 3 = AT &D0 &E1 &E15 S0=1 V0
Modem Setup Line 4 = AT E0 X4 &C4 $SB19200
Modem Setup Line 5 = AT &W0
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Messages
-------------------------------------------------------------------------------
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Temperature.................... NO      Length......................... NO
Slow........................... YES     Power Off...................... YES
Repeat No Defects.............. YES     Cars Count..................... NO
Customer Name.................. YES     Arrival Message................ NO
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Request EOT Timer..............  5      Rebroad DTMF Code.............. 001
Announce Cold Rail............. YES
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Scanner Calibration Date
-------------------------------------------------------------------------------
Rail1..........01/15/2009 15:10:48     Rail2..........01/15/2009 15:12:51
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SmartSCAN NG – System Status Report

```
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Modem Setup Line 2 = AT&F
Modem Setup Line 3 = AT &D0 &E1 &E15 S0=1 V0
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Messages
-------------------------------------------------------------------------------
Axles.......................... NO      Speed.......................... NO
Temperature.................... NO      Length......................... NO
Slow........................... YES     Power Off...................... YES
Repeat No Defects.............. YES     Cars Count..................... NO
Customer Name.................. YES     Arrival Message................ NO
Lft/Rt Alarm Ref............... NO      Car ID With Alarm.............. NO
Request EOT Timer..............  5      Rebroad DTMF Code.............. 001
Announce Cold Rail............. YES

Scanner Calibration Date
-------------------------------------------------------------------------------
Rail1.....01/15/2009 15:10:48     Rail2.....01/15/2009 15:12:51
```

Smart*SCAN* NG – System Status Report

```
Port Settings
----------------------------------
COM1 Tx/Rx Baud 19200/19200 N-8-1
COM2 Tx/Rx Baud 19200/19200 N-8-1
COM3 Tx/Rx Baud 19200/19200 N-8-1
COM4 Tx/Rx Baud 19200/19200 N-8-1

DCS Parameters
---------------------------------------------------------------------------
Enabled........................ NO     Site ID..................... 03008
Owner Code..................... NS     Line Segment.................. DBRN
Retry Attempts.................. 3     Retry Delay.................... 120
Comport...................... COM2

                              COP
Firmware Versions          Resets
-----------------------------------
Analyzer:  NSA2.17-G 02/12/08    0
Comm    :  NSA2.17-G 02/19/08    0
Speech  :  NS1.04


EPCC
---------------------------------
Date Tested:10/04/07  S/N: 410513
```

SmartSCAN NG – System Status Report

```
Port Settings
---------------------------------
COM1 Tx/Rx Baud 19200/19200 N-8-1
COM2 Tx/Rx Baud 19200/19200 N-8-1
COM3 Tx/Rx Baud 19200/19200 N-8-1
COM4 Tx/Rx Baud 19200/19200 N-8-1
```

```
DCS Parameters
-------------------------------------------------------------------------------
Enabled.......................... NO      Site ID..................... 03008
Owner Code....................... NS      Line Segment................ DBRN
Retry Attempts.................... 3      Retry Delay................. 120
Comport..........................COM2
```

```
                                   COP
Firmware Versions                Resets
-----------------------------------
Analyzer:  NSA2.17-G 02/12/08      0
Comm    :  NSA2.17-G 02/19/08      0
Speech  :  NS1.04
```

```
EPCC
--------------------------------
Date Tested:10/04/07  S/N: 410513
```

SmartSCAN NG – System Status Report

```
Port Settings
---------------------------------
COM1 Tx/Rx Baud 19200/19200 N-8-1
COM2 Tx/Rx Baud 19200/19200 N-8-1
COM3 Tx/Rx Baud 19200/19200 N-8-1
COM4 Tx/Rx Baud 19200/19200 N-8-1

DCS Parameters
-------------------------------------------------------------------------------
Enabled.......................... NO      Site ID..................... 03008
Owner Code....................... NS      Line Segment................ DBRN
Retry Attempts................... 3       Retry Delay................. 120
Comport.......................... COM2

                                    COP
Firmware Versions                 Resets
-----------------------------------------
Analyzer:  NSA2.17-G 02/12/08       0
Comm    :  NSA2.17-G 02/19/08       0
Speech  :  NS1.04

EPCC
---------------------------------
Date Tested:10/04/07  S/N: 410513
```

SmartSCAN NG – System Status Report

```
Port Settings
---------------------------------
COM1 Tx/Rx Baud 19200/19200 N-8-1
COM2 Tx/Rx Baud 19200/19200 N-8-1
COM3 Tx/Rx Baud 19200/19200 N-8-1
COM4 Tx/Rx Baud 19200/19200 N-8-1

DCS Parameters
-------------------------------------------------------------------------------
Enabled.......................... NO      Site ID..................... 03008
Owner Code....................... NS      Line Segment................ DBRN
Retry Attempts................... 3       Retry Delay................. 120
Comport.......................... COM2

                                   COP
Firmware Versions                Resets
---------------------------------------
Analyzer:  NSA2.17-G 02/12/08      0
Comm    :  NSA2.17-G 02/19/08      0
Speech  :  NS1.04
```

```
EPCC
-------------------------------
Date Tested:10/04/07  S/N: 410513
```

SmartSCAN NG – System Status Report

Resistor Data

VOLTS	AMB	DATE	TIME	STATUS	30	40	50	60	70	80	90	100	110	120	130
	140	160	180	200	220	240	260	280	300	320	340	360	380	400	420	440	460	480
RAIL 1															
13.7	076	01/15/09	15:39	VALID	164	192	215	232	245	255	263	268	274	277	280
	284	290	294	296	300	300	300	300	300	300	300	300	300	300	300	300	300	300
RAIL 2															
13.7	076	01/15/09	15:39	VALID	160	190	214	232	247	256	265	271	277	281	284
	287	292	296	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300

RESISTOR STATUS: VALID
INVALID
PENDING

SmartSCAN NG – Event Log

Southern Technologies Corporation
Event Log

01/16/2009
09:42:12

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145 01/16/09 09:41:40 <Train Stored>
144 01/16/09 09:41:30 <Store Train #44>
143 01/16/09 09:39:53 <System Accessed>
142 01/16/09 09:39:03 <Train Arrival>
141 01/16/09 09:33:18 <Train Stored>
140 01/16/09 09:33:17 <Store Train #43>
139 01/16/09 09:31:02 <Train Arrival>
138 01/16/09 09:25:19 <Train Stored>
137 01/16/09 09:25:17 <Store Train #42>
136 01/16/09 09:24:23 <Train Arrival>
135 01/16/09 09:18:37 <Train Stored>

Any Questions?

Thank you!