

ABC COMPANY  
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## Report of Eddy Current Inspection

Manufacturer: York

Model: YT-B2-B2-B2

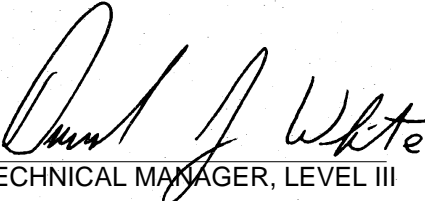
Serial: YBRM037257 #2

Location: HIGH RISE ONE  
1941 BAY STREET  
ATLANTA, GA 30067

Inspected: January 13, 2014

Inspected By: MICHAEL W. GOINS, LEVEL III  
TAI Services, Inc.

Reviewed By:

  
TECHNICAL MANAGER, LEVEL III

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Vessel Information

Manufacturer	Model	Style	Serial Number	Type
York	YT-B2-B2-B2	Open Drive	YBRM037257 #2	Centrifugal

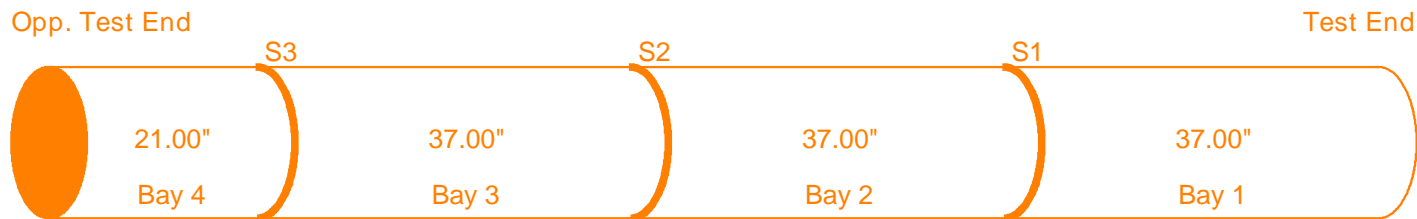
Condenser	
TestEnd	Right Hand Facing Controls
Tube Count	186
Tube Type	Skip Fin IE
Tube Material	Copper
OD	.750
*NWT/Under Fins	.028
*NWT/Bell/Land	.055
#/Type Support	3 Mild Steel
Tube Numbering	Top to Bottom
Row Numbering	Left to Right
Tube Length +- 2	132 Inches

Analyst: MICHAEL W. GOINS, LEVEL III

\* Nominal Wall Thickness

## Vessel Bay Length Information

Condenser (Length = 132 inches)  
S = Intermediate Support



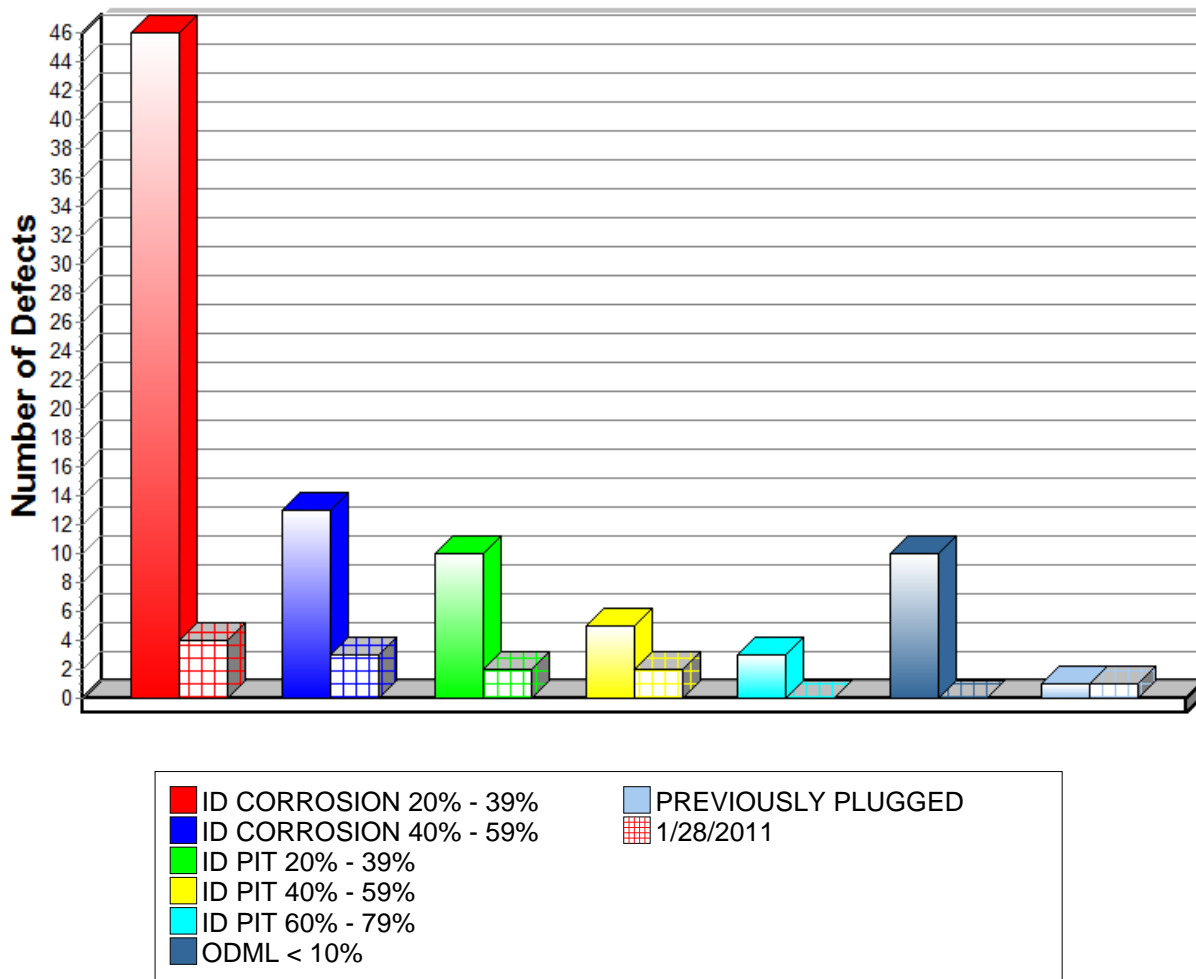
Bay 4	21.00"
Bay 3	37.00"
Bay 2	37.00"
Bay 1	37.00"

## Defect Summary/Comparison

Comparison of Tests Performed

1/13/2014 1/28/2011

### Condenser Defects



Location	Model	Serial Number
HIGH RISE ONE	YT-B2-B2-B2	YBRM037257 #2

Note: The Graph will indicate a Comparison Analysis when the unit has been previously tested by TAI Services.

## Summary of Inspection

An eddy current tube inspection was performed as part of a preventive maintenance program with the following results.

Condenser: 186 Tubes		
Significant/Measurable Indications	Number of Tubes Marked	Percent of Bundle
ODML < 10%	10	5.38
ID CORROSION 20% - 39%	46	24.73
ID CORROSION 40% - 59%*	13	6.99
ID PIT 20% - 39%	10	5.38
ID PIT 40% - 59%*	5	2.69
ID PIT 60% - 79%*	3	1.61
PREVIOUSLY PLUGGED	1	.54
Totals	88	47.32

**\* REQUIRES ACTION**

NOTE: Although not marked on the tube chart, the majority of the tubes gave indications of minor ID Corrosion. See Strip Chart Recordings. Only the more significant corrosion was marked to keep the tube chart neat and legible, and to better illustrate any major defect patterns that may exist.

However, due to the nature of this type damage, small but significant defects could be masked. We recommend this tube bundle be pressure tested if a leak is suspected.

## Recommendations

An eddy current inspection was performed on the tubes in this machine. This test was performed using accepted eddy current test methods for the inspection of in-service tubing. It should be noted that Eddy Current is not a leak detection method. The possibility does exist that tubes could contain defects and/or leaks which are not detectable. If leaks are suspected, we recommend a pressure test be used to identify the leaking tubes.

The following suggested repair actions are based on accepted industry standards. After removing sample tubes to confirm the inspection results, a determination of corrective action should be made by the repair agency and end user. Only these parties have knowledge of the critical applications and long-term use of the equipment. If plugging is selected over replacement, both efficiency and capacity should be considered.

### CONDENSER:

The amount of OD Metal Loss detected during this inspection is minor and requires no corrective action at the present time. This damage usually results from acids forming in the refrigerant due to moisture contamination.

We recommend tubes indicating ID Corrosion and/or Pitting of 40% or more be isolated from the system at this time. Damage of less than 40% requires no immediate corrective action, however, the affected tubes should be monitored for defect growth. This type of damage is usually progressive and results from chemical or biological attack.

Tubes marked as Previously Plugged, had been plugged prior to this inspection.

### RE-INSPECTION RECOMMENDATIONS:

We recommend that a follow-up inspection be performed on these vessels as follows:

Condenser: 12 January 2015

A copy of this report should be retained in your files to be used for comparison at that time.

If you should have any questions concerning this report, or if we may be of further assistance, please feel free to call upon us.

Data Sheet

Location	Model	Serial Number	Date
HIGH RISE ONE	YT-B2-B2-B2	YBRM037257 #2	November 5, 2015
1941 BAY STREET			
ATLANTA, GA 30067			

Row	Tube	Description	Area	Action Req.
<b>SET UP CALIBRATE &amp; STARTED</b>				
CONDENSER 1/13/2014 10:04 am				
1	4	ID PIT 20% - 39%	B02	
2	2	ID CORROSION 20% - 39%	B03	
2	3	ID CORROSION 20% - 39%	B03	
2	4	<b>ID CORROSION 40% - 59%</b>	B02	✓
2	6	ID PIT 20% - 39%	B02	
3	2	ID CORROSION 20% - 39%	B03	
3	3	ID CORROSION 20% - 39%	B03	
3	4	ID CORROSION 20% - 39%	B03	
3	5	ID PIT 20% - 39%	B02	
4	3	ID CORROSION 20% - 39%	B03	
4	4	<b>ID CORROSION 40% - 59%</b>	B02	✓
4	5	ID CORROSION 20% - 39%	B02	
4	6	ID PIT 20% - 39%	B03	
5	1	ID CORROSION 20% - 39%	B02	
5	3	<b>ID CORROSION 40% - 59%</b>	B03	✓
5	4	ID CORROSION 20% - 39%	B02	
5	5	ID CORROSION 20% - 39%	B02	
6	1	ID CORROSION 20% - 39%	B02	
6	2	ID PIT 20% - 39%	B02	



Row	Tube	Description	Area	Action Req.
6	3	ID CORROSION 40% - 59%	B02	✓
6	4	ID PIT 60% - 79%	B04	✓
6	5	ID CORROSION 20% - 39%	B02	
6	6	ID PIT 20% - 39%	B02	
7	1	ID CORROSION 40% - 59%	B03	✓
7	2	ID CORROSION 20% - 39%	B02	
7	3	ID CORROSION 20% - 39%	B02	
7	4	ID CORROSION 20% - 39%	B02	
8	2	ID CORROSION 20% - 39%	B02	
8	3	ID PIT 20% - 39%	B02	
8	4	ID CORROSION 20% - 39%	B02	
8	5	ID CORROSION 20% - 39%	B01	
9	1	ID CORROSION 20% - 39%	B02	
9	2	ID CORROSION 20% - 39%	B02	
9	3	ID CORROSION 20% - 39%	B02	
9	4	ID CORROSION 20% - 39%	B02	
9	5	ID CORROSION 20% - 39%	B01	
9	6	ID CORROSION 20% - 39%	B01	
10	1	ID CORROSION 40% - 59%	B01	✓
10	2	ID CORROSION 20% - 39%	B02	
10	3	ID CORROSION 20% - 39%	B02	
10	4	ID CORROSION 20% - 39%	B02	
10	5	ID CORROSION 20% - 39%	B01	
11	1	ID CORROSION 40% - 59%	B02	✓
11	2	ID CORROSION 20% - 39%	B03	
11	6	ID PIT 40% - 59%	B03	✓

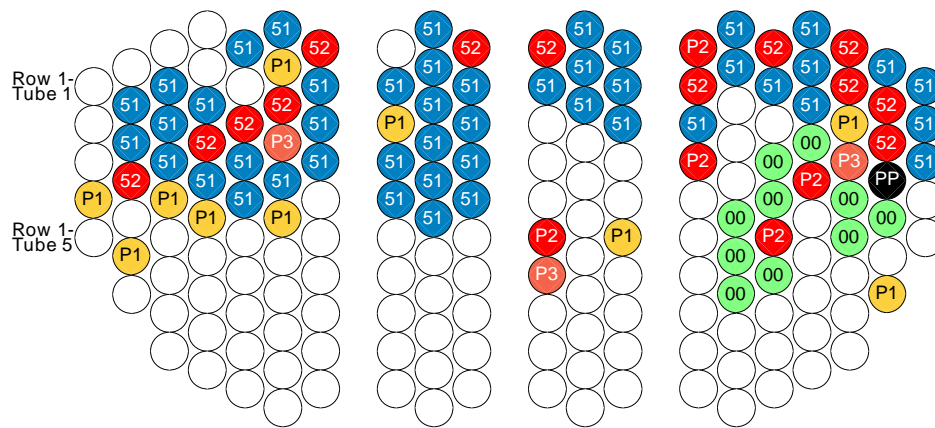
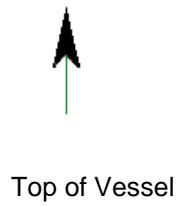
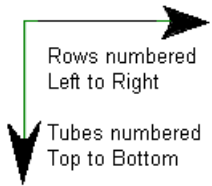
Row	Tube	Description	Area	Action Req.
11	7	ID PIT 60% - 79%	B03	✓
12	1	ID CORROSION 20% - 39%	B02	
12	2	ID CORROSION 20% - 39%	B02	
12	3	ID CORROSION 20% - 39%	51	
13	1	ID CORROSION 20% - 39%	B03	
13	2	ID CORROSION 20% - 39%	B02	
13	3	ID CORROSION 20% - 39%	B02	
13	6	ID PIT 20% - 39%	B03	
14	1	ID PIT 40% - 59%	B02	✓
14	2	ID CORROSION 40% - 59%	B02	✓
14	3	ID CORROSION 20% - 39%	B02	
14	4	ID PIT 40% - 59%	B03	✓
15	1	ID CORROSION 20% - 39%	B03	
15	2	ID CORROSION 20% - 39%	B03	
15	6	ODML < 10%	B03	
15	7	ODML < 10%	B03	
15	8	ODML < 10%	B03	
16	1	ID CORROSION 40% - 59%	B03	✓
16	2	ID CORROSION 20% - 39%	B03	
16	4	ODML < 10%	B03	
16	5	ODML < 10%	B03	
16	6	ID PIT 40% - 59%	B02	✓
16	7	ODML < 10%	B03	
17	1	ID CORROSION 20% - 39%	B03	
17	2	ID CORROSION 20% - 39%	B03	
17	3	ID CORROSION 20% - 39%	B03	

Row	Tube	Description	Area	Action Req.
17	4	ODML < 10%	B03	
17	5	ID PIT 40% - 59%	B03	✓
18	1	ID CORROSION 40% - 59%	B03	✓
18	2	ID CORROSION 40% - 59%	B03	✓
18	3	ID PIT 20% - 39%	B03	
18	4	ID PIT 60% - 79%	B03	✓
18	5	ODML < 10%	B03	
18	6	ODML < 10%	B03	
19	1	ID CORROSION 20% - 39%	B03	
19	2	ID CORROSION 40% - 59%	B02	✓
19	3	ID CORROSION 40% - 59%	B02	✓
19	4	PREVIOUSLY PLUGGED	TE	
19	5	ODML < 10%	B03	
19	7	ID PIT 20% - 39%	B02	
20	1	ID CORROSION 20% - 39%	B02	
20	2	ID CORROSION 20% - 39%	B02	
20	3	ID CORROSION 20% - 39%	B02	
<b>CALIBRATION CHECK &amp; COMPLETED</b>				
CONDENSER 1/13/2014 11:17 am				

# Condenser Section

S/N YBRM037257 #2

Right Hand Facing Controls

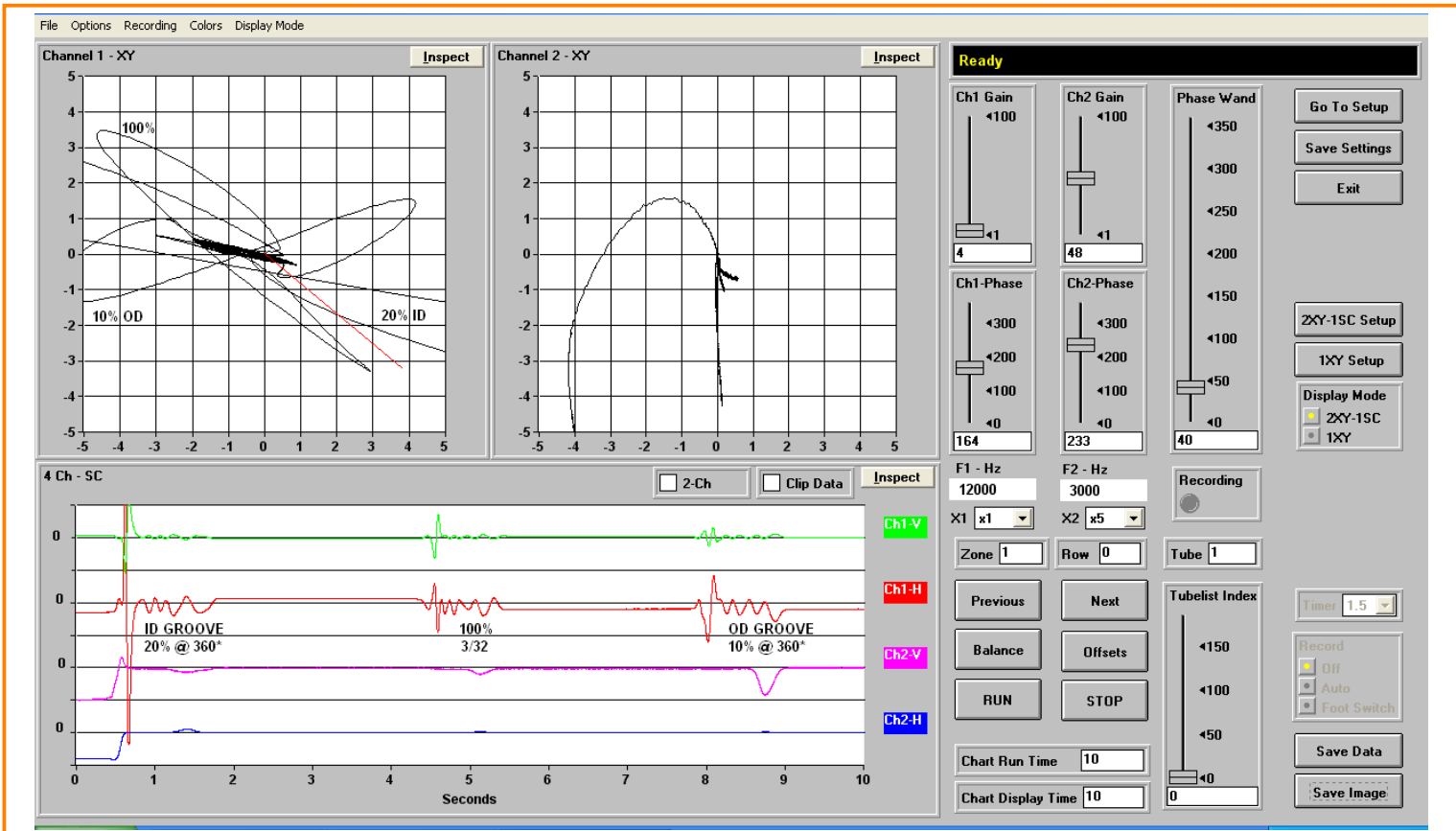


- 00 = ODML < 10%
- 51 = ID CORROSION 20% - 39%
- 52 = ID CORROSION 40% - 59%      **REQUIRES ACTION**
- P1 = ID PIT 20% - 39%
- P2 = ID PIT 40% - 59%      **REQUIRES ACTION**
- P3 = ID PIT 60% - 79%      **REQUIRES ACTION**
- PP = PREVIOUSLY PLUGGED

## Calibration Page

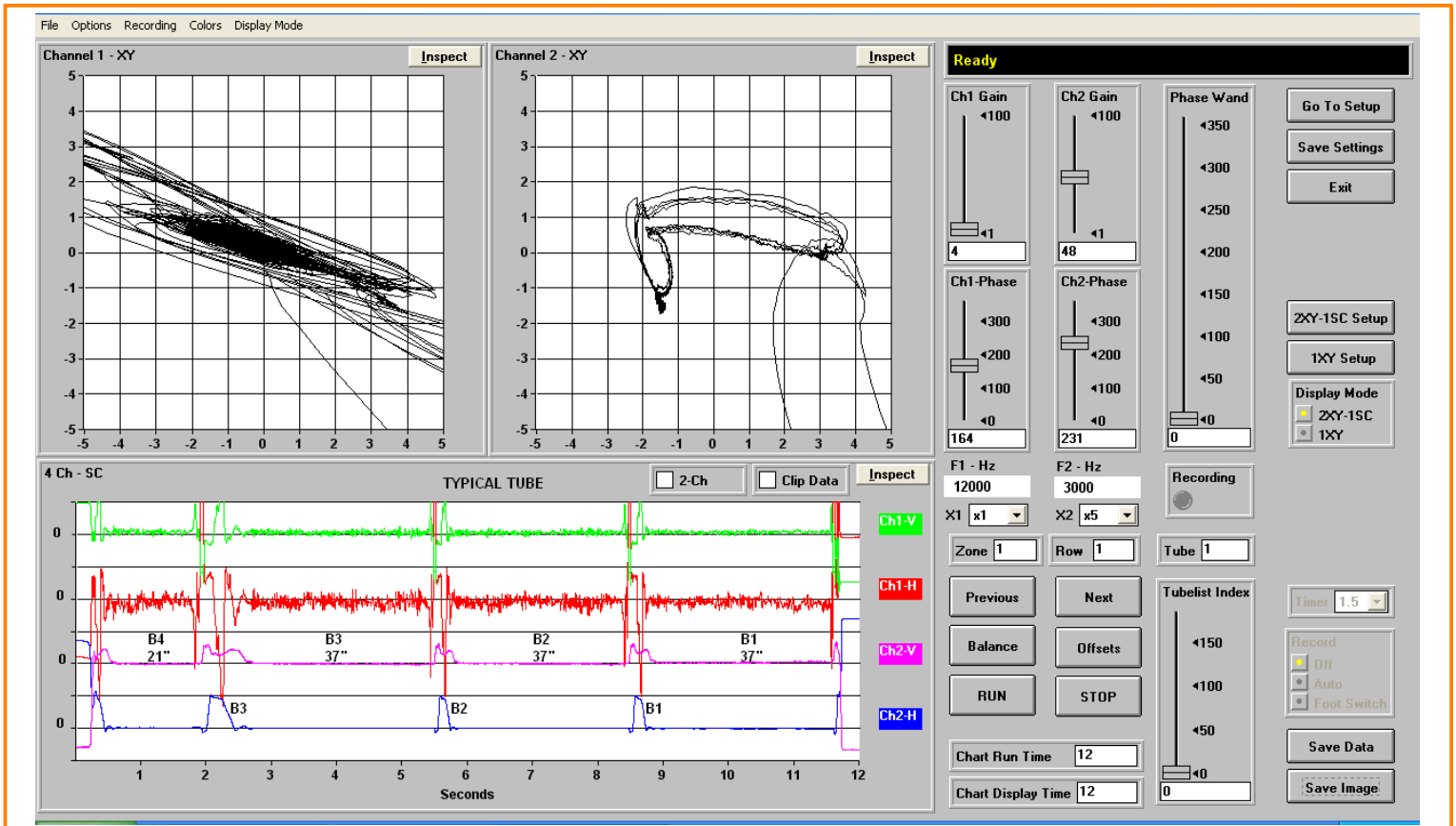
Tube Type	Material	Nom Wall Thick	End Wall Thick	OD	Test Type	Probe Diameter
Skip Fin IE	Copper	.028	.055	.750	CROSS/DIFF	0.500

Condenser



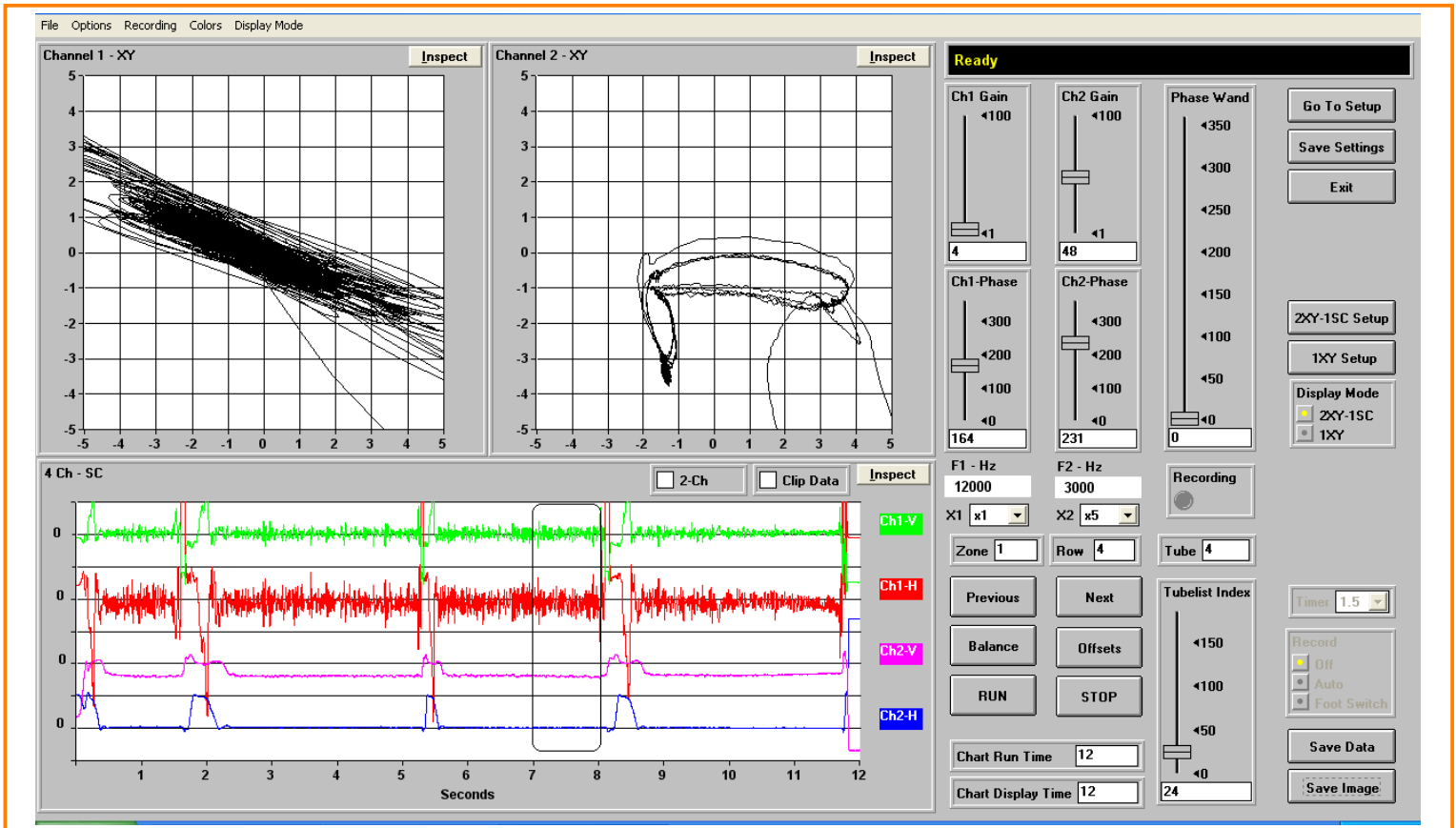
Note: Defects are compared to machined standards.  
Actual Defect Geometry may differ.

# Condenser Section



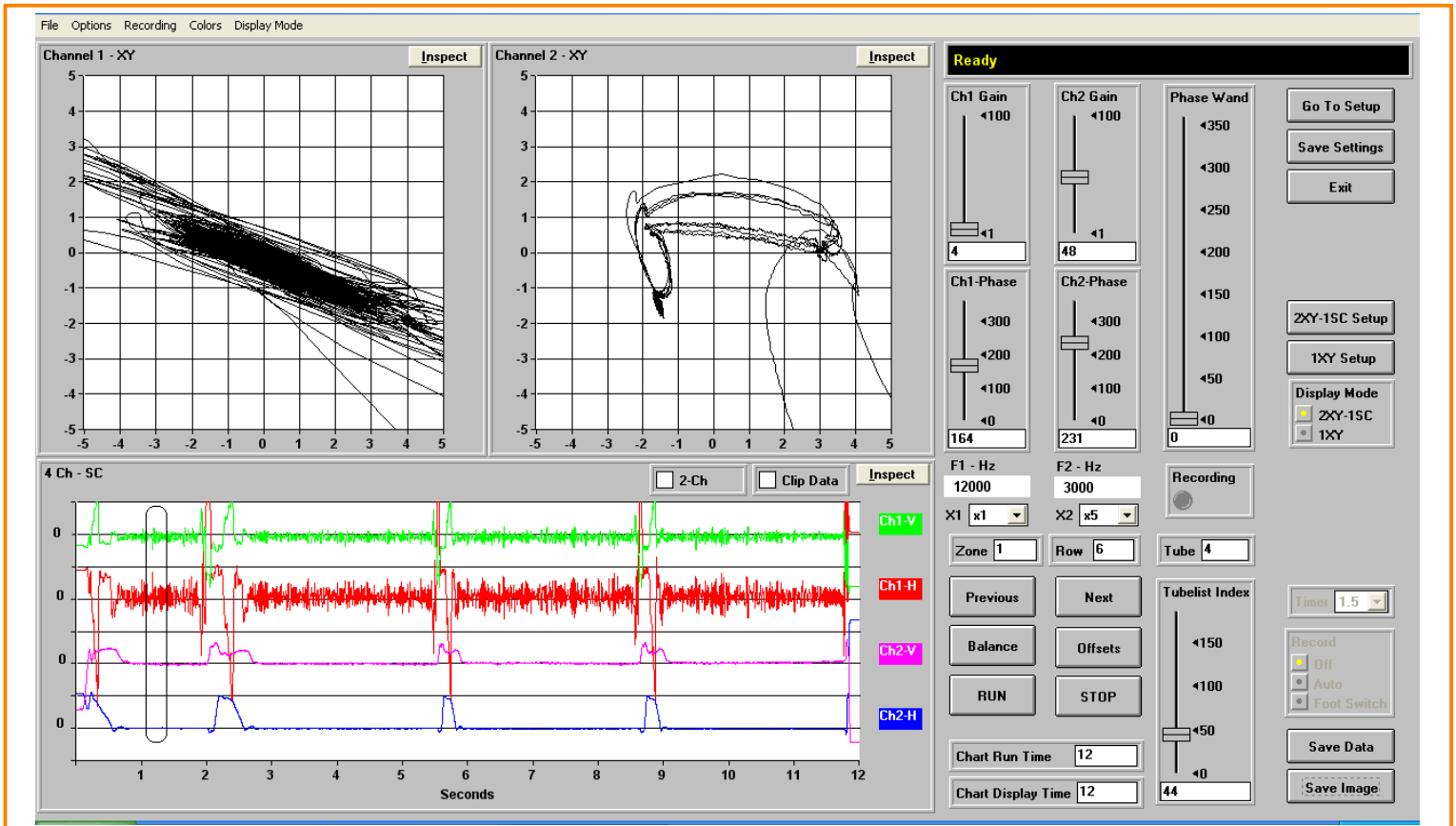
TYPICAL TUBE (Row 1 Tube 1)

# Condenser Section



ID CORROSION 40% - 59% (Row 4 Tube 4)

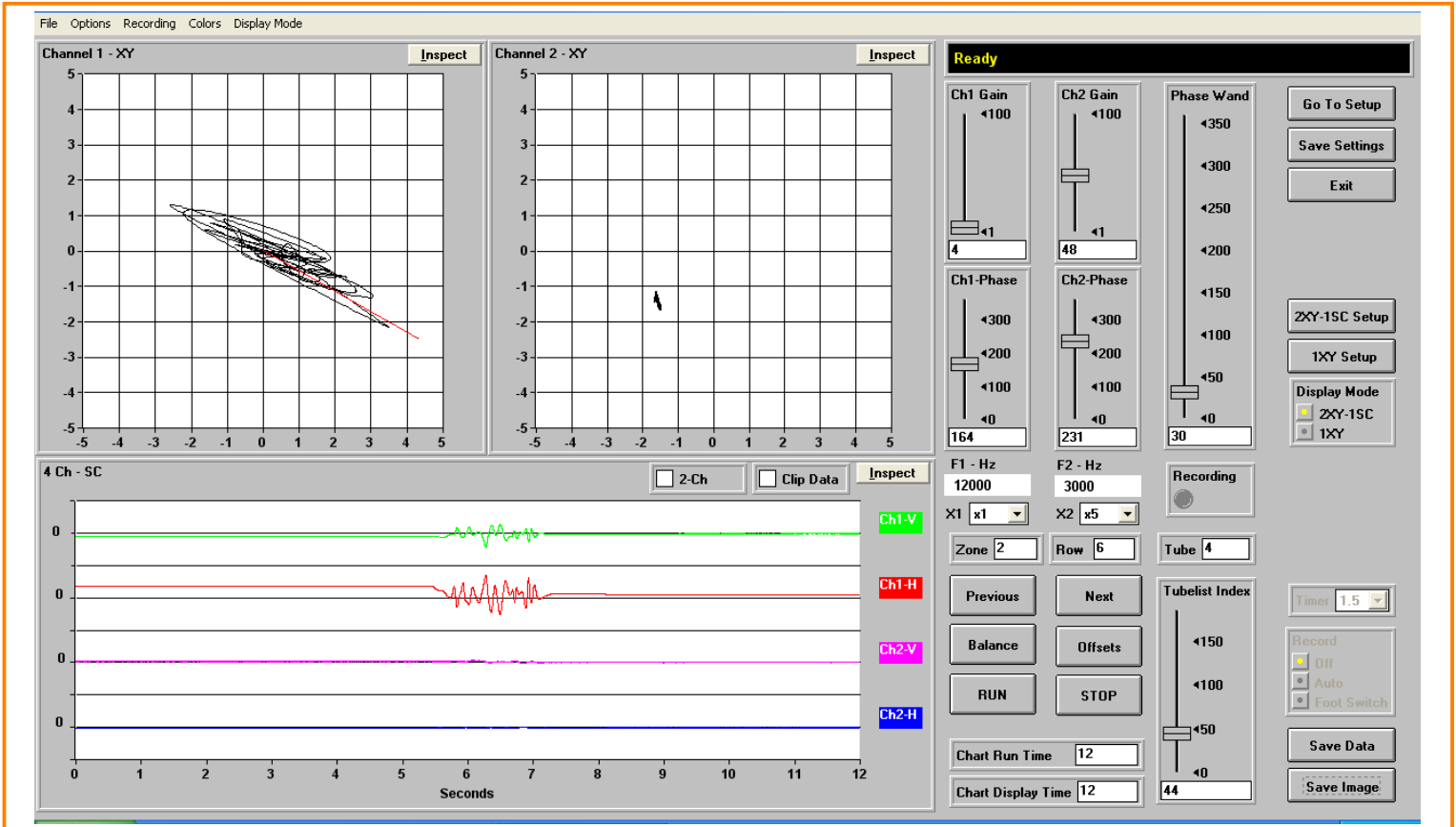
# Condenser Section



ID PIT 60% - 79% (Row 6 Tube 4)

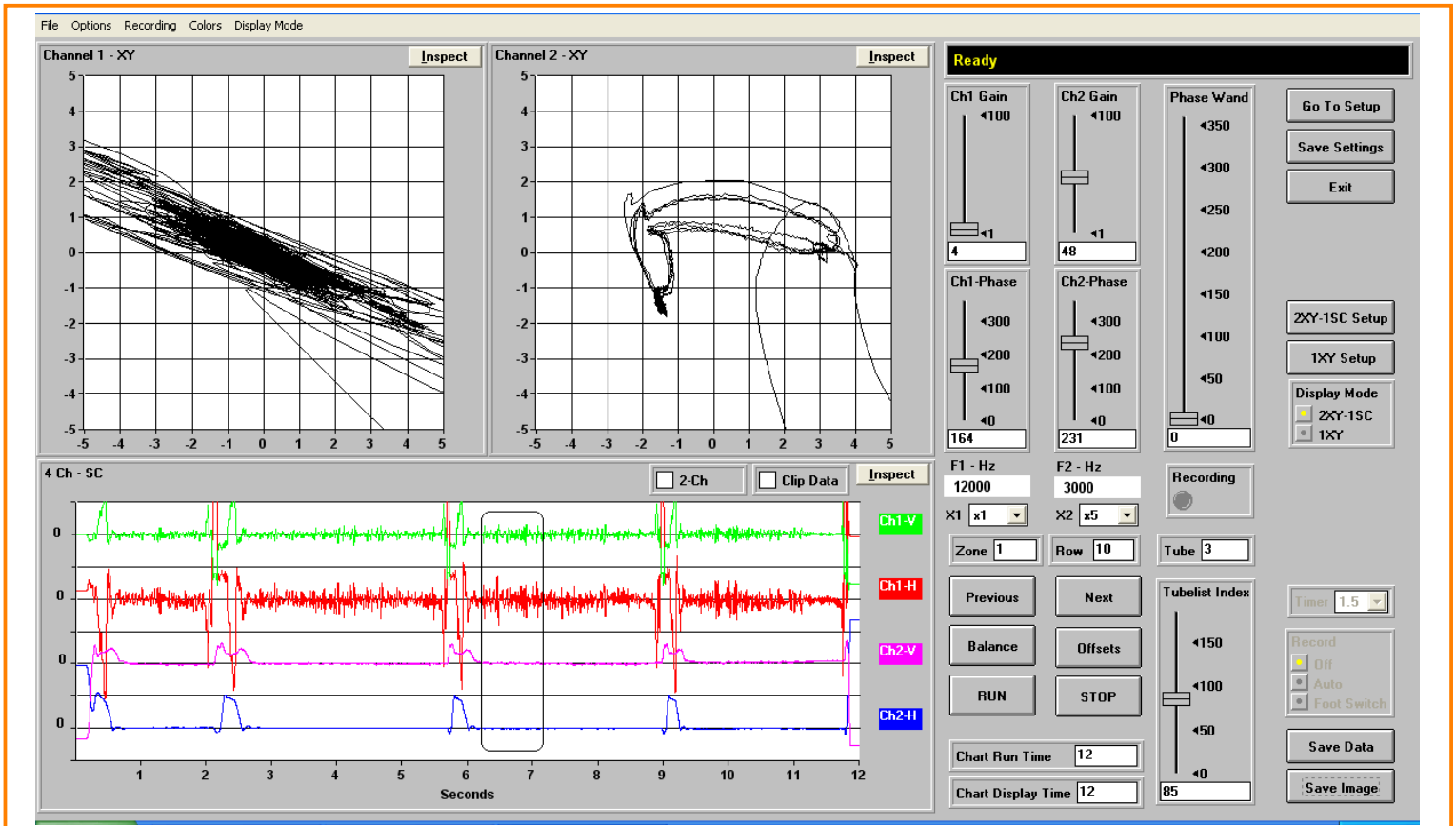


# Condenser Section



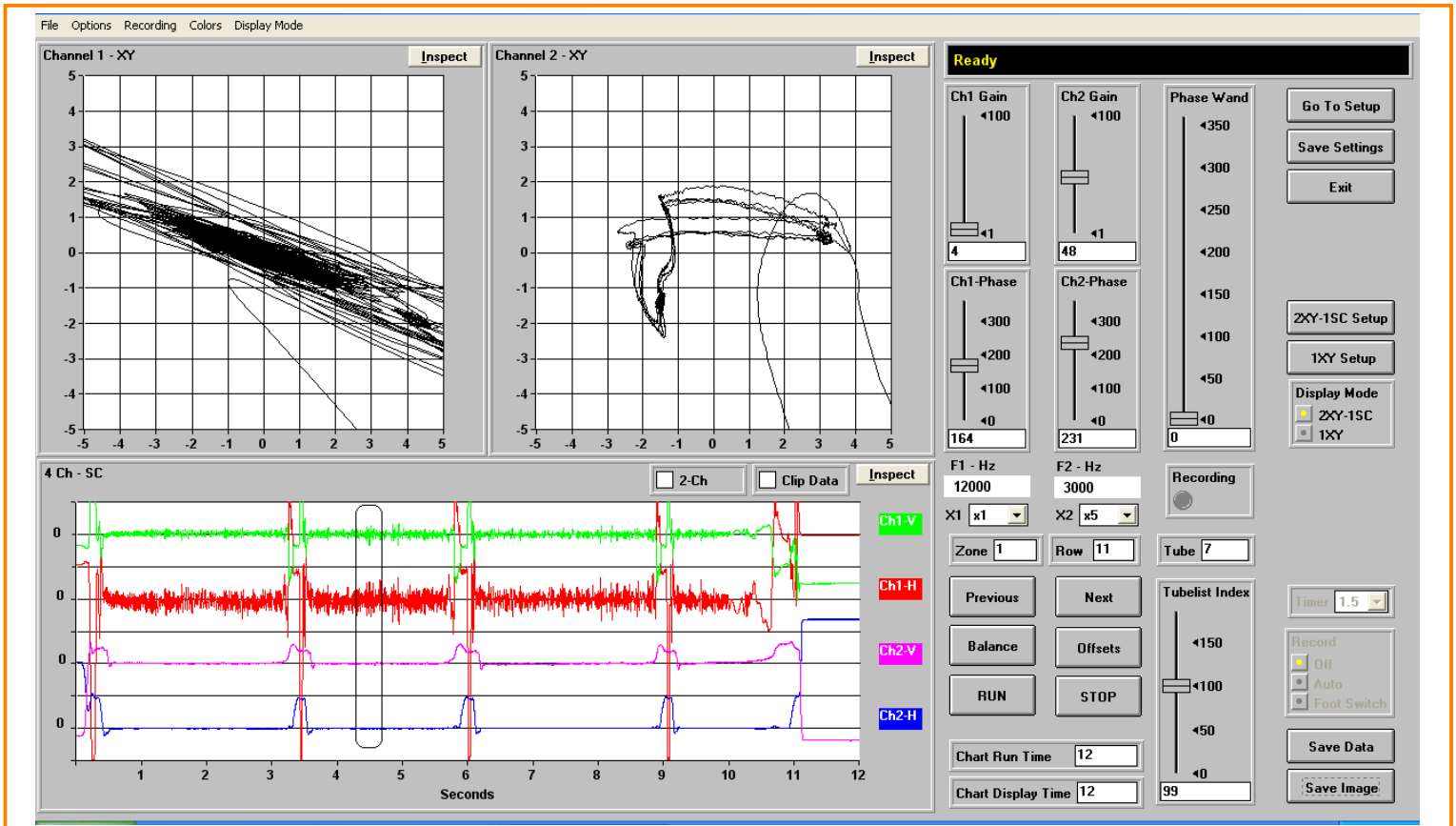
ID PIT 60% - 79% (Row 6 Tube 4)

## Condenser Section



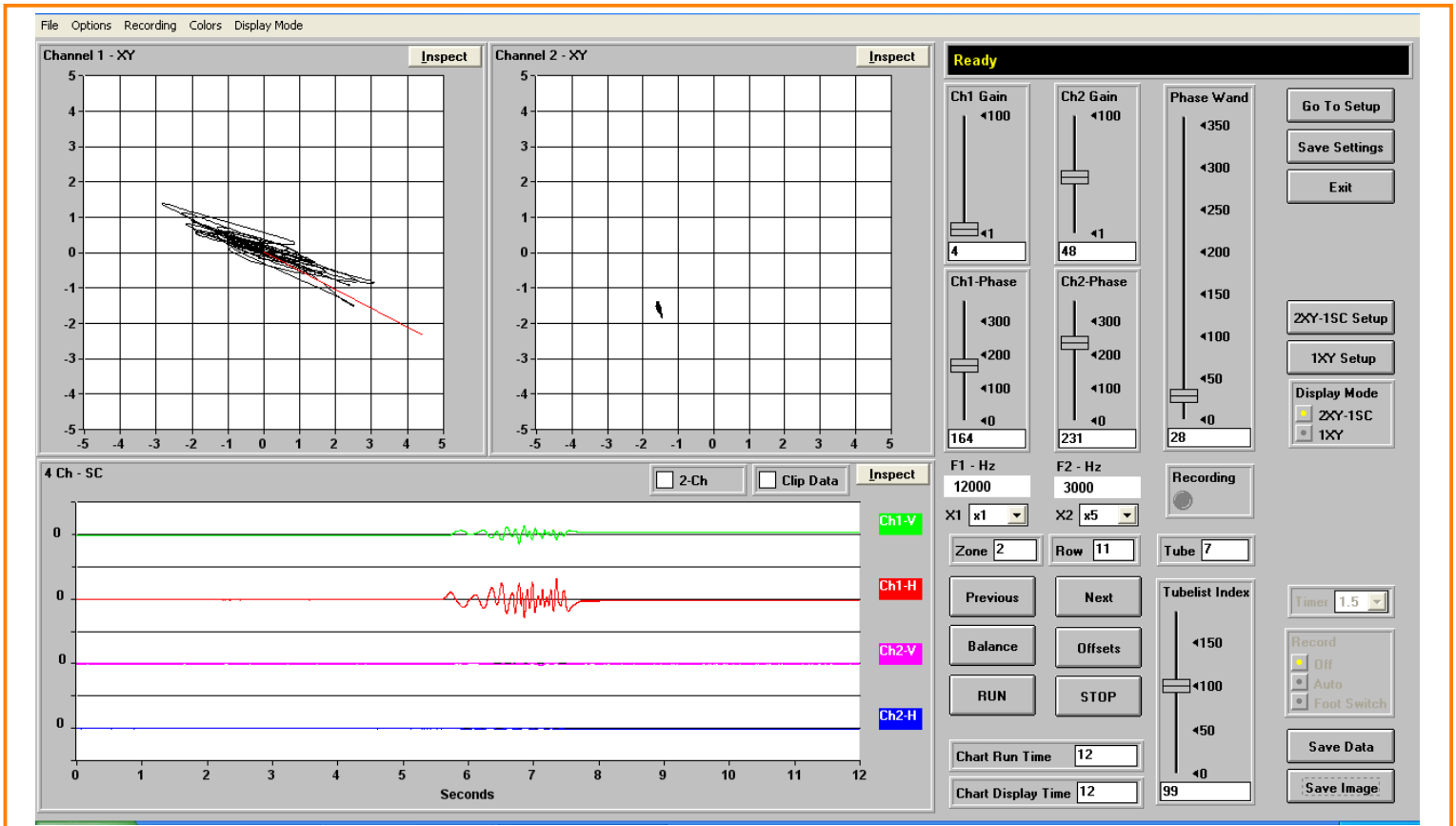
ID CORROSION 20% - 39% (Row 10 Tube 3)

# Condenser Section



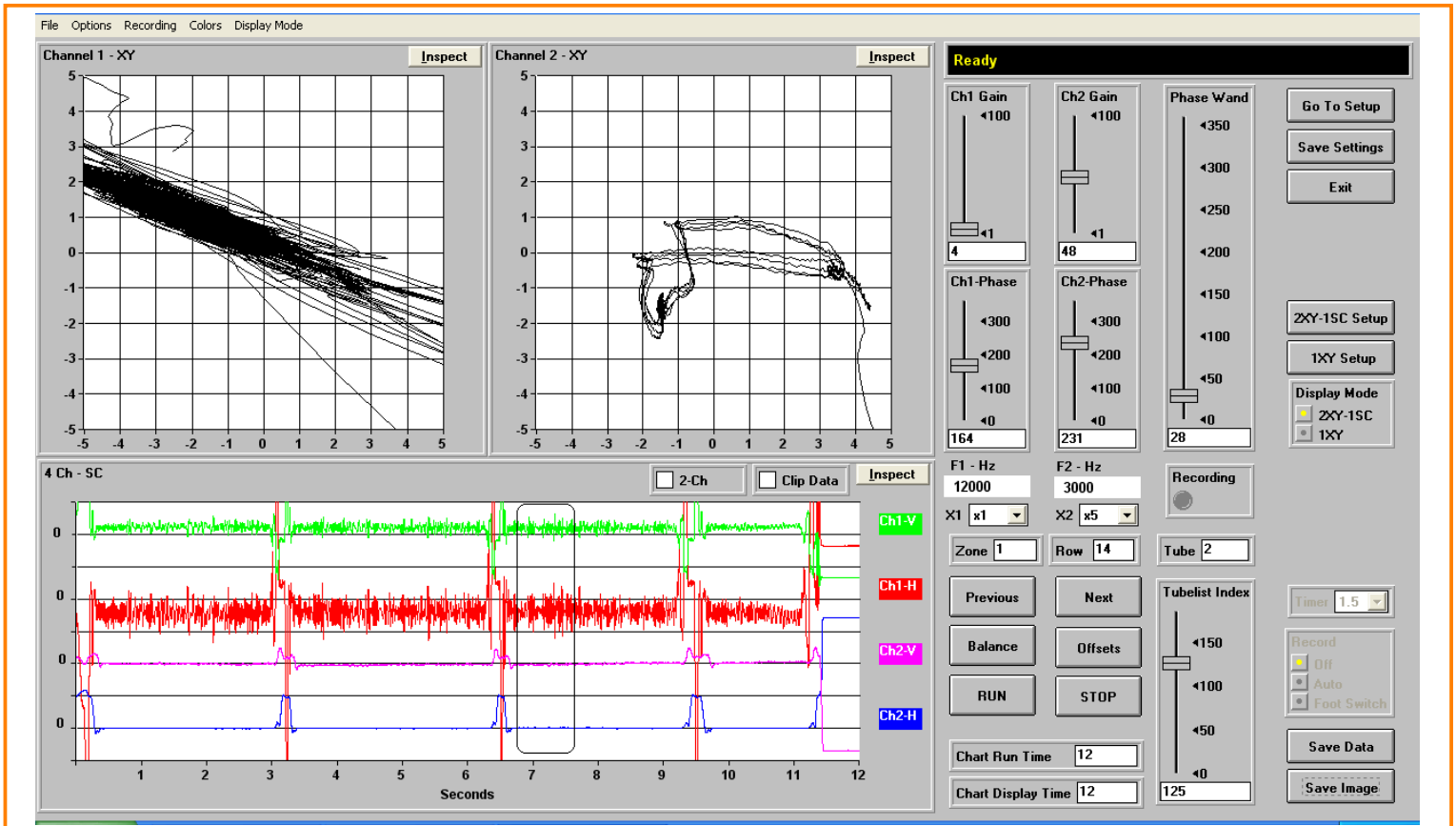
ID PIT 60% - 79% (Row 11 Tube 7)

# Condenser Section



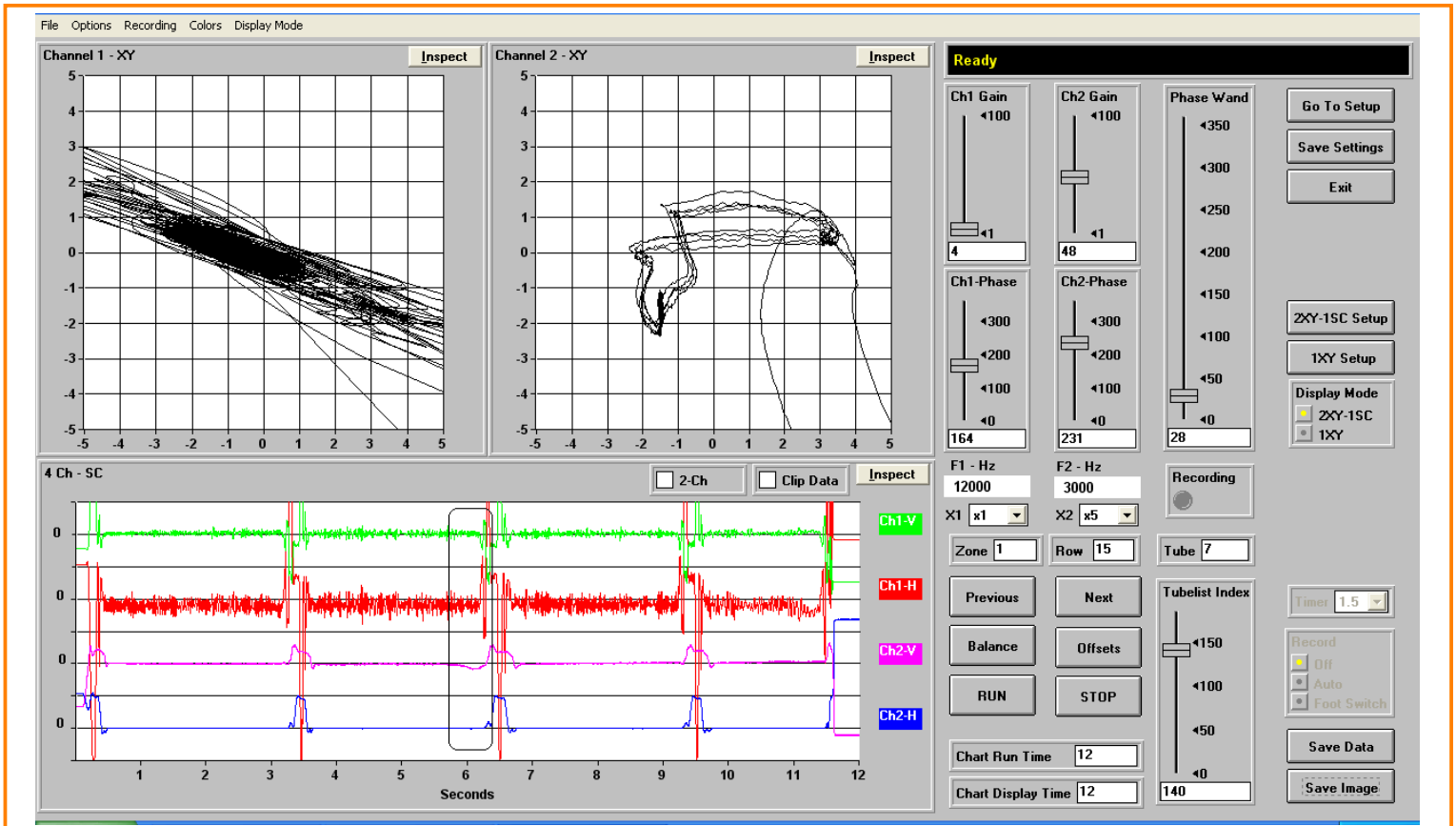
ID PIT 60% - 79% (Row 11 Tube 7)

## Condenser Section



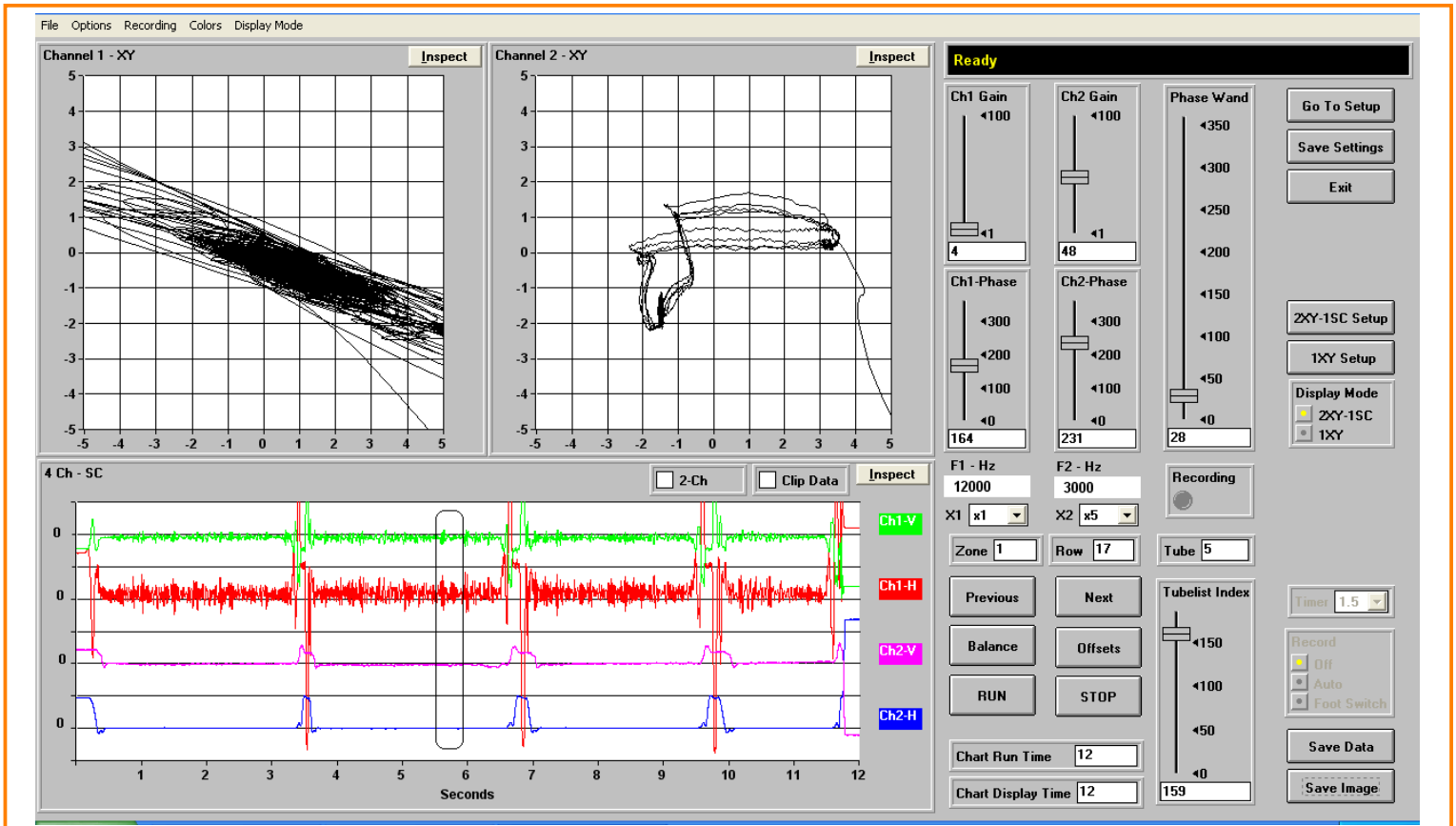
ID CORROSION 40% - 59% (Row 14 Tube 2)

## Condenser Section



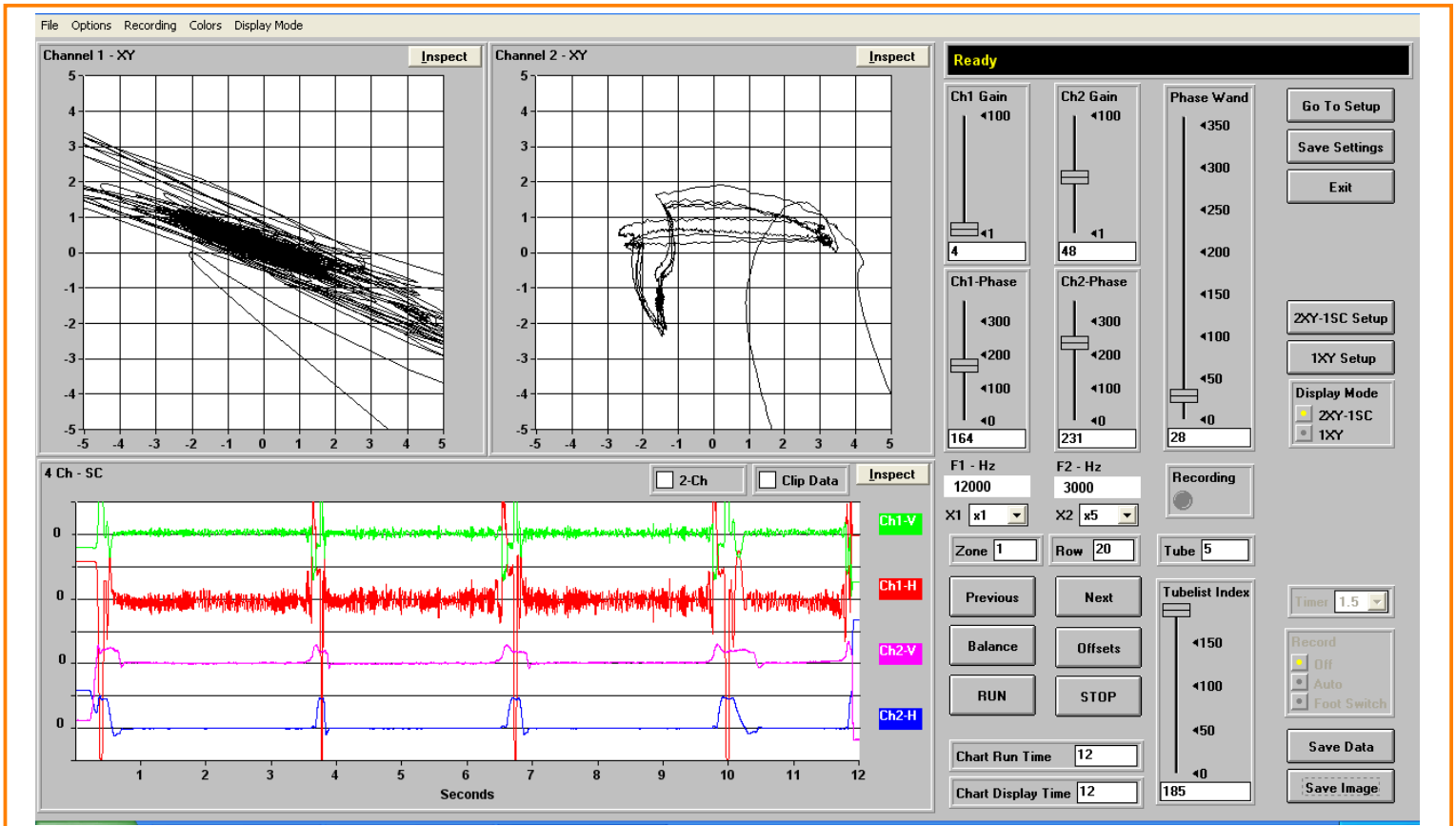
ODML < 10% (Row 15 Tube 7)

## Condenser Section



ID PIT 40% - 59% (Row 17 Tube 5)

# Condenser Section



NO SIGNIFICANT DEFECTS (Row 20 Tube 5)



## Calibration Procedure

A calibration procedure is performed prior to an inspection, and is repeated every 2 hours, or whenever improper operation of the test instrument is suspected. Test frequencies are selected prior to an inspection through experimentation to achieve optimum phase separation, and amplitude response for the tube type and alloy being inspected. An appropriate inspection probe is selected based on tube type, wall thickness, and alloy. The inspection probe will have a minimum fill factor of 80% through the smallest areas of the tubes being inspected. Instrument sensitivity is set high enough to determine background noise inherent in the tube and to produce a .05 Volt deflection for a .031 through wall hole at .25 V/Div.

## Calibration Reference Standard

A Calibration Reference Standard representing a typical production run tube of the same alloy, tube type and nominal wall thickness is used to adjust test system response. The calibration reference standard used for the inspection of finned and internally enhanced tubing, has been milled in accordance with the American Society for Testing and Materials (ASTM). Standard Recommended Practices, E-243-80, E-426-76, and E571-76. The depth of the grooves and notches used for establishing instrument response are calculated to compensate for the influence of the fins and/or internal enhancements used on finned tubes. Where applicable, calibration reference standards are milled in accordance with the American Society of Mechanical Engineers (ASME), Section V, Article 8, Appendix I.

A strip chart recording of each calibration reference standard used for the inspection has been included in this report. Each artificial discontinuity has been identified on the strip chart recording.

## Explanation of Abbreviations

Abbreviation	Explanation
ABN IND	Abnormal Indication
B	Bay
FB	Freeze Bulge
FBH	Flat Bottom Hole
FM	Foreign Material
ID	Internal Diameter
ID CORROSION	Internal Diameter, Corrosion
ID DEPOSIT	Internal Diameter, Deposit
ID PIT	Internal Diameter, Pit
IDML	Internal Diameter, Metal Loss
IE	Internally Enhanced
OD	Outside Diameter
ODML	Outside Diameter, Metal Loss
ODML@S	Outside Diameter Metal Loss at Support
OD DEPOSIT	Outside Diameter, Deposit
PLF	Possible Longitudinal Flaw
PRF	Possible Radial Flaw
PSC	Possible Stress Corrosion
S	Support
WAS	Wear at Support
>	Greater Than
<	Less Than
OTE	Opposite Test End
TE	Test End