Report By:

National TAB
1329 E. KEMPER ROAD
SUITE 4210
CINCINNATI, OH 45246

Report: TAB REPORT

Function: Test, Adjust, & Balance

Date: 11/29/2023

PROJECT

11-06-23 CARMAX #7178 - WAUKESHA, WI

2441 KOSSOW RD

WAUKESHA, WI 53186

Client

Comfort Systems USA

9450 W Wingfoot Rd

Houston, TX 77041

Project Summary

The summary below provides a quick understanding of our scope of work and general testing procedures. Enclosed in the report is further detail about your building performance including recommendations, asset data, and pictures. Our focus is to work with the trades to remedy any issues or deficiencies during the actual field balancing and not after the balancing has occurred to achieve a positive environment and outcome. The level of success is determined by the availability of the trades, possible parts needed, or time constraints.

Facility Identification and TAB Requirements
The mechanical equipment to be tested, adjusted, and balanced includes all RTU's and EF's on the Test and Balance Scope on the mechanical drawings.

Standard RTU’s
Each of the RTU’s were measured at their terminal devices utilizing a flow hood or via total traverse. The sum of these readings is equal to the total flow for that unit. The total flow of each RTU was then adjusted to within tolerance of the specified design. Outside airflow was measured by reading the inlet with a velocity grid times the area of the filter. Any equipment that fell outside of this tolerance is noted throughout the report.

Bypass RTU's
The Bypass RTU's were measured by first closing the bypass damper completely. By doing this, the outside airflow is equal to the total flow for the unit. The airflow was measured using a velgrid at the outdoor air intake and multiplying by the free area of the filters. Adjustments were made to the motor sheave to get airflow within tolerance of design. The bypass damper was then adjusted so that bypass and OA flows are within tolerance.

Exhaust Fans
The exhaust fans were measured by reading each air device with a flow hood or via a velgrid reading times the free area of the inlets. The total airflow for each fan is equivalent to the sum of these readings. Fan speed was then adjusted so that the airflow was within tolerance of design. Any equipment that fell outside of this tolerance is noted throughout the report.

CheckList List

- TECH - SITE PICTURES
- TECH - STEP 1: INITIAL SITE WALKTHROUGH
- TECH - STEP 2: UNIT DATA AND EVAL
- TECH - STEP 3: TEST, ADJUST AND BALANCE

11-06-23 CARMAX #7178 - WAUKESHA, WI

CheckList Information

Name :	TECH - SITE PICTURES	**Status :**	Not Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	11/03/2023 - Brian Turnbough - National TAB		

CheckList Item Details

STORE FRONT

Comment:

Carmax-7178-WaukeshaW..
11/29/2023

RTU-1

Comment:

RTU-1
11/29/2023

Label
11/29/2023

RTU-2

Comment:

RTU-2(2)
11/29/2023

Label
11/29/2023

RTU-3

Comment:

RTU-3(2)
11/29/2023

Unitlabel(1)
11/29/2023

RTU-4

Comment:

RTU-4
11/29/2023

Unitlabel(1)
11/29/2023

RTU-5

Comment:

RTU-5
11/29/2023

Unitlabel(1)
11/29/2023

RTU-6

Comment:

RTU-6
11/29/2023

Unitlabel(1)
11/29/2023

RTU-7

Comment:

RTU-7
11/29/2023

Unitlabel(1)
11/29/2023

RTU-8

Comment:

RTU-8
11/29/2023

Unitlabel(1)
11/29/2023

RTU-9

Comment:

RTU-9
11/29/2023

Unitlabel(1)
11/29/2023

EF-8

Comment:

EF-8
11/29/2023

Label
11/29/2023

11-06-23 CARMAX #7178 - WAUKESHA, WI

CheckList Information

Name :	TECH - STEP 1: INITIAL SITE WALKTHROUGH	**Status :**	Not Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	11/03/2023 - Brian Turnbough - National TAB		

CheckList Item Details

INITIAL SITE WALKTHROUGH

All diffusers and grilles are installed and match design?	Yes
Comment:	
All hood filters installed and accounted for?	N/A
Comment:	
Hoods are wired and have power?	N/A
Comment:	
Hood is free of alarms?	N/A
Comment:	
Thermostats have power?	N/A
Comment:	

Have trades/general contractor been notified about any issues and are they created on FaciliBuild?

Comment:

Yes

11-06-23 CARMAX #7178 - WAUKESHA, WI

CheckList Information

Name :	TECH - STEP 2: UNIT DATA AND EVAL	**Status :**	Not Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	11/03/2023 - Brian Turnbough - National TAB		

CheckList Item Details

UNIT DATA AND EVALUATION WHILE GATHERING UNIT DATA CHECK THE FOLLOWING:

RTU's/AHU's

Economizers are assembled and functional?	Yes
Comment:	
DCV Max damper opening position is set to minimum?	Yes
Comment:	
Free cooling enthalpy set point set for lowest setting (Typically "D")	Yes
Comment:	
Motors are all operating below the FLA rating?	Yes
Comment:	
Are belts tight?	
Comment:	
Yes	
If direct drive unit is the speed controller working.	

Comment:

Yes

Is gas piping installed and valves turned on?	Yes

Comment:

Unit free of noticeable noise and vibration	Yes

Comment:

EF's

Rotation is correct?	Yes

Comment:

Belts are tight?

Comment:

Yes

There is no major leakage around base of fan?	Yes

Comment:

Is the motor operating below the motor FLA rating?	N/A

Comment:

Unable to read motor amperage safely.

Unit free of noticeable noise and vibration?	Yes

Comment:

DOCUMENTATION

Have trades/general contractor been notified about any issues and are they created on FaciliBuild?	Yes

Comment:

11-06-23 CARMAX #7178 - WAUKESHA, WI

CheckList Information

Name :	TECH - STEP 3: TEST, ADJUST AND BALANCE	**Status :**	Not Completed
Assigned Organization :	National TAB	**Asset :**	
Requesting Organization :	National TAB		
Created Date :	11/03/2023 - Brian Turnbough - National TAB		

CheckList Item Details

TEST, ADJUST, AND BALANCE ALL EQUIPMENT:

DURING TESTING MAKE NOTE OF THE FOLLOWING:

Is space free of drafting?	Yes
Comment:	
Is space comfortable in all areas?	Yes
Comment:	
Is the space free of ventilation noise?	Yes
Comment:	

If deviations from design were necessary to resolve 1-3 what were they? Otherwise put "NA".

Comment:

NA

National TAB

Project: 11-06-23 CARMAX #7178 - WAUKESHA, WI

System/Unit: AHU/RTU

Asset: RTU1 AREA:SHOWROOM

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5623H03940
Model Num	LGH180H4M	LGH180H4M
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	3
OA Filter Size 1	-	23X13
Num Final Filter 1	-	6
Final Filter Size 1	-	24X24X2

Motor Data		
	Design	**Actual**
Motor MFG	-	INTERLINK
Frame	-	56HZ
Horsepower	3.0	3.0
Motor Rpm	-	1750
Phase	3	3
Rated Voltage	480	480
Rated Amperage	-	4.0

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	4"
Motor Bore Size	-	7/8"
Motor Sheave SetPt	-	4.5 TURNS OPEN
Fan Sheave Size	-	BK72
Fan Sheave Bore	-	1-3/16"
Belt CL Distance	-	20.5"
Num of Belts	-	1
Belt Size	-	BX55
Belt Alignment	-	VERIFIED

Test Data		
	Design	**Actual**
SF CFM	5750	5851
SF RPM	-	758
RA CFM	5100	5228
OA CFM	650	623
RL Voltage	-	486/487/486
RL Amperage	-	3.8/3.9/4.0
SF Rotation	-	CORRECT
RA Damper Position	-	HIGH: 78% LOW: 71%
Min OA Damper Position	-	HIGH: 22% LOW: 29%
Min OA Damper Type	-	ECONOMIZER

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.39"
Fan Suction SP	-	-0.68"
Fan Discharge SP	-	0.52"
Total ESP	0.8"	0.91"
Fan Total SP	-	1.20"

General		
	Design	**Actual**
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

Completed By: Michael McDonnell on 11/09/2023

National TAB

Project: 11-06-23 CARMAX #7178 - WAUKESHA, WI

System/Unit: AHU/RTU

Asset: RTU2 AREA:SHOWROOM

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622F01133
Model Num	LGH180H4M	LGH180H4M
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	3
OA Filter Size 1	-	23X13
Num Final Filter 1	-	6
Final Filter Size 1	-	24X24X2

Motor Data		
	Design	**Actual**
Motor MFG	-	INTERLINK
Frame	-	56 HZ
Horsepower	3.0	3.0
Motor Rpm	-	1750
Phase	3	3
Rated Voltage	480	480
Rated Amperage	-	4.0

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	3.75"
Motor Bore Size	-	7/8"
Motor Sheave SetPt	-	1.5 TURNS OPEN
Fan Sheave Size	-	BK95
Fan Sheave Bore	-	1-3/16"
Belt CL Distance	-	20.75"
Num of Belts	-	1
Belt Size	-	BX59
Belt Alignment	-	VERIFIED

Test Data		
	Design	**Actual**
SF CFM	5750	5682
SF RPM	-	702
RA CFM	5100	4997
OA CFM	650	685
RL Voltage	-	484/484/484
RL Amperage	-	3.1/3.2/3.2
SF Rotation	-	CORRECT
RA Damper Position	-	HIGH: 77% LOW: 73%
Min OA Damper Position	-	HIGH: 23% LOW: 27%
Min OA Damper Type	-	ECONOMIZER

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.36"
Fan Suction SP	-	-0.54"
Fan Discharge SP	-	0.32"
Total ESP	0.8"	0.68"
Fan Total SP	-	0.86"

General		
	Design	**Actual**
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

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National TAB

Project: 11-06-23 CARMAX #7178 - WAUKESHA, WI

System/Unit: AHU/RTU

Asset: RTU3 AREA:CUSTOMER

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622G11413
Model Num	LGH036H4E	LGH036H4E
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	29X14.5
Num Final Filter 1	-	4
Final Filter Size 1	-	16X20X2

Motor Data		
	Design	**Actual**
Motor MFG	-	GENTEQ
Horsepower	1/2	0.5
Motor Rpm	-	NL
Phase	1	1
Rated Voltage	115	115
Rated Amperage	-	2.2

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	HIGH: 68% LOW: 44%
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	1100	1156
SF RPM	-	DD
RA CFM	960	1010
OA CFM	140	146
RL Voltage	-	119
RL Amperage	-	1.2
SF Rotation	-	CORRECT
RA Damper Position	-	HIGH: 82% LOW: 72%
Min OA Damper Position	-	HIGH: 18% LOW: 28%
Min OA Damper Type	-	ECONOMIZER

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.11"
Fan Suction SP	-	-0.24"
Fan Discharge SP	-	0.48"
Total ESP	0.6"	0.59"
Fan Total SP	-	0.72"

General		
	Design	**Actual**
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

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Project: 11-06-23 CARMAX #7178 - WAUKESHA, WI

System/Unit: AHU/RTU

Asset: RTU4 AREA:

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622G11456
Model Num	LGH060H4E	LGH060H4E
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
OA Filter Size 1	-	29X14.25
Num Final Filter 1	-	4
Final Filter Size 1	-	20X20X2

Motor Data		
	Design	**Actual**
Motor MFG	-	GENTEQ
Frame	-	NL
Horsepower	1.0	1.0
Motor Rpm	-	NL
Phase	1	1
Rated Voltage	115	115
Rated Amperage	-	3.7

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	HIGH: 70% LOW: 42%
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	1600	1558
SF RPM	-	DD
RA CFM	1300	1242
OA CFM	300	316
RL Voltage	-	120
RL Amperage	-	2.4
SF Rotation	-	CORRECT
RA Damper Position	-	HIGH: 79% LOW: 67%
Min OA Damper Position	-	HIGH: 21% LOW: 33%
Min OA Damper Type	-	ECONOMIZER

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.19"
Fan Suction SP	-	-0.33"
Fan Discharge SP	-	0.50"
Total ESP	0.6"	0.69"
Fan Total SP	-	0.83"

General		
	Design	**Actual**
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

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Project: 11-06-23 CARMAX #7178 - WAUKESHA, WI

System/Unit: AHU/RTU

Asset: RTU5 AREA:BUYERS

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622G11416
Model Num	LGH036H4E	LGH036H4E
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	29X14.25
Num Final Filter 1	-	4
Final Filter Size 1	-	16X20X2

Motor Data		
	Design	**Actual**
Motor MFG	-	GENTEQ
Frame	-	NL
Horsepower	1/2	0.5
Motor Rpm	-	NL
Phase	3	1
Rated Voltage	480	115
Rated Amperage	-	2.2

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	HIGH: 69% LOW: 42%
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	1100	1164
SF RPM	-	DD
RA CFM	920	992
OA CFM	180	172
RL Voltage	-	120
RL Amperage	-	1.1
SF Rotation	-	CORRECT
RA Damper Position	-	HIGH: 78% LOW: 67%
Min OA Damper Position	-	HIGH: 22% LOW: 33"
Min OA Damper Type	-	ECONOMIZER

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.10"
Fan Suction SP	-	-0.25"
Fan Discharge SP	-	0.40"
Total ESP	0.6"	0.50"
Fan Total SP	-	0.65"

General		
	Design	**Actual**
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

Completed By: Michael McDonnell on 11/09/2023

National TAB

Project: 11-06-23 CARMAX #7178 - WAUKESHA, WI

System/Unit: AHU/RTU

Asset: RTU6 AREA:PBX

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622G08952
Model Num	LGH036H4E	LGH036H4E
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	29X14.25
Num Final Filter 1	-	4
Final Filter Size 1	-	16X20X2

Motor Data		
	Design	**Actual**
Motor MFG	-	GENTEQ
Horsepower	1/2	0.50
Motor Rpm	-	NL
Phase	3	1
Rated Voltage	480	115
Rated Amperage	-	2.2

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	HIGH: 62% LOW: 40%
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	975	1012
SF RPM	-	DD
RA CFM	975	1012
OA CFM	0	0
RL Voltage	-	119
RL Amperage	-	1.2
SF Rotation	-	CORRECT
RA Damper Position	-	NA
Min OA Damper Position	-	NA
Min OA Damper Type	-	NONE
OA Enthalpy Setpt	-	NA

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.11"
Fan Suction SP	-	-0.27"
Fan Discharge SP	-	0.30"
Total ESP	0.8"	0.41"
Fan Total SP	-	0.57"

General		
	Design	**Actual**
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

Completed By: Michael McDonnell on 11/09/2023

National TAB

Project: 11-06-23 CARMAX #7178 - WAUKESHA, WI

System/Unit: AHU/RTU

Asset: RTU7 AREA:SERVICE WRITER

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622G11414
Model Num	LGH036H4E	LGH036H4E
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	29X14.25
Num Final Filter 1	-	4
Final Filter Size 1	-	16X20X2

Motor Data		
	Design	**Actual**
Motor MFG	-	GENTEQ
Horsepower	1/2	0.5
Motor Rpm	-	NL
Phase	1	1
Rated Voltage	115	115
Rated Amperage	-	2.2

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	67%
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	1100	1171
SF RPM	-	DD
RA CFM	940	1022
OA CFM	160	149
RL Voltage	-	120
RL Amperage	-	1.6
SF Rotation	-	CORRECT
RA Damper Position	-	81%
Min OA Damper Position	-	19%
Min OA Damper Type	-	ECONOMIZER

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.26"
Fan Suction SP	-	-0.37"
Fan Discharge SP	-	0.32"
Total ESP	0.6"	0.58"
Fan Total SP	-	0.69"

General		
	Design	**Actual**
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

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National TAB

Project: 11-06-23 CARMAX #7178 - WAUKESHA, WI

System/Unit: AHU/RTU

Asset: RTU8 AREA:BREAK/TRAIN

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622G11257
Model Num	LGH048H4E	LGH048H4E
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	1
OA Filter Size 1	-	29X14.25
Num Final Filter 1	-	4
Final Filter Size 1	-	16X20X2

Motor Data		
	Design	**Actual**
Motor MFG	-	GENTEQ
Horsepower	3/4	0.50
Motor Rpm	-	NL
Phase	3	1
Rated Voltage	480	115
Rated Amperage	-	3.1

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	DD
Motor Bore Size	-	DD
Motor Sheave SetPt	-	HIGH: 62% LOW: 42%
Fan Sheave Size	-	DD
Fan Sheave Bore	-	DD
Belt CL Distance	-	DD
Num of Belts	-	DD
Belt Size	-	DD
Belt Alignment	-	DD

Test Data		
	Design	**Actual**
SF CFM	1400	1425
SF RPM	-	DD
RA CFM	1250	1264
OA CFM	150	161
RL Voltage	-	119
RL Amperage	-	2.1
SF Rotation	-	CORRECT
RA Damper Position	-	HIGH: 80% LOW: 73%
Min OA Damper Position	-	HIGH: 20% LOW: 27%
Min OA Damper Type	-	ECONOMIZER

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.22"
Fan Suction SP	-	-0.42"
Fan Discharge SP	-	0.32"
Total ESP	0.6"	0.54"
Fan Total SP	-	0.74"

General		
	Design	**Actual**
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

Completed By: Michael McDonnell on 11/09/2023

National TAB

Project: 11-06-23 CARMAX #7178 - WAUKESHA, WI

System/Unit: AHU/RTU

Asset: RTU9 AREA:SERVICE AREA

Unit Data		
	Design	**Actual**
MFG	LENNOX	LENNOX
Serial Num	-	5622F01088
Model Num	LGH240H4B	LGH240H4B
Type	RTU	RTU
Configuration	VERTICAL	VERTICAL
Num OA Filters 1	-	3
OA Filter Size 1	-	23X13
Num Final Filter 1	-	6
Final Filter Size 1	-	24X24X2

Motor Data		
	Design	**Actual**
Motor MFG	-	INTERLINK
Frame	-	56HZ
Horsepower	5.0	5.0
Motor Rpm	-	1750
Phase	3	3
Rated Voltage	480	460
Rated Amperage	-	7.6

Drive Data		
	Design	**Actual**
Motor Sheave Size	-	1VP65
Motor Bore Size	-	1-1/8"
Motor Sheave SetPt	-	6 TURNS OPEN
Fan Sheave Size	-	11"
Fan Sheave Bore	-	1-3/16"
Belt CL Distance	-	21"
Num of Belts	-	1
Belt Size	-	BX65
Belt Alignment	-	VERIFIED

Test Data		
	Design	**Actual**
SF CFM	5000	5205
SF RPM	-	840
RA CFM	0	0
OA CFM	5000	7127
RL Voltage	-	489/489/489
RL Amperage	-	6.2/5.7/5.9
SF Rotation	-	CORRECT
RA Damper Position	-	0%
Min OA Damper Position	-	100%
Min OA Damper Type	-	ECONOMIZER
OA Enthalpy Setpt	-	5.0

Performance Data		
	Design	**Actual**
MA Plenum SP	-	-0.50"
Fan Suction SP	-	-0.89"
Fan Discharge SP	-	0.38"
Total ESP	1.0"	0.88"
Fan Total SP	-	1.27"

General		
	Design	**Actual**
Fan Rotation Correct	-	YES
Unit Filters Clean	-	YES
Condensate Drain Installed	-	YES

Completed By: Michael McDonnell on 11/29/2023

National TAB

Project:11-06-23 CARMAX #7178 - WAUKESHA, WI

AHU/RTU

Diffuser Supply (GRD)

RTU9/SERVICE AREA

Asset									
Asset Name	**Location**	**Type**	**Size**	**DESIGN CFM**	**AK**	**CFM(1)**	**CFM(2)**	**FINAL CFM**	**% to design**
RTU9-SGRD1	TOILET	NA	8/8 NK	70	1.0	0	56	74	105.7
RTU9-SGRD2	SERVICE	NA	36/12 NK	755	2.77	1192	926	790	104.6
RTU9-SGRD3	SERVICE	NA	36/12 NK	755	2.77	1084	842	772	102.3
RTU9-SGRD4	SERVICE	NA	36/12 NK	755	2.77	1012	786	794	105.2
RTU9-SGRD5	SERVICE	NA	36/12 NK	755	2.77	936	727	759	100.5
RTU9-SGRD6	SERVICE	NA	36/12 NK	755	2.77	944	733	789	104.5
RTU9-SGRD7	SERVICE	NA	36/12 NK	755	2.77	1085	843	805	106.6
RTU9-SGRD8	PARTS	10/10 NK	10/10 NK	200	0.56	289	224	208	104.0
RTU9-SGRD9	PARTS	10/10 NK	10/10 NK	200	0.56	316	245	214	107.0
Total				5000		6858	5382	5205	104.1%

Completed By: Michael McDonnell on 11/29/2023

National TAB

Project: 11-06-23 CARMAX #7178 - WAUKESHA, WI

System/Unit: FAN - Exhaust

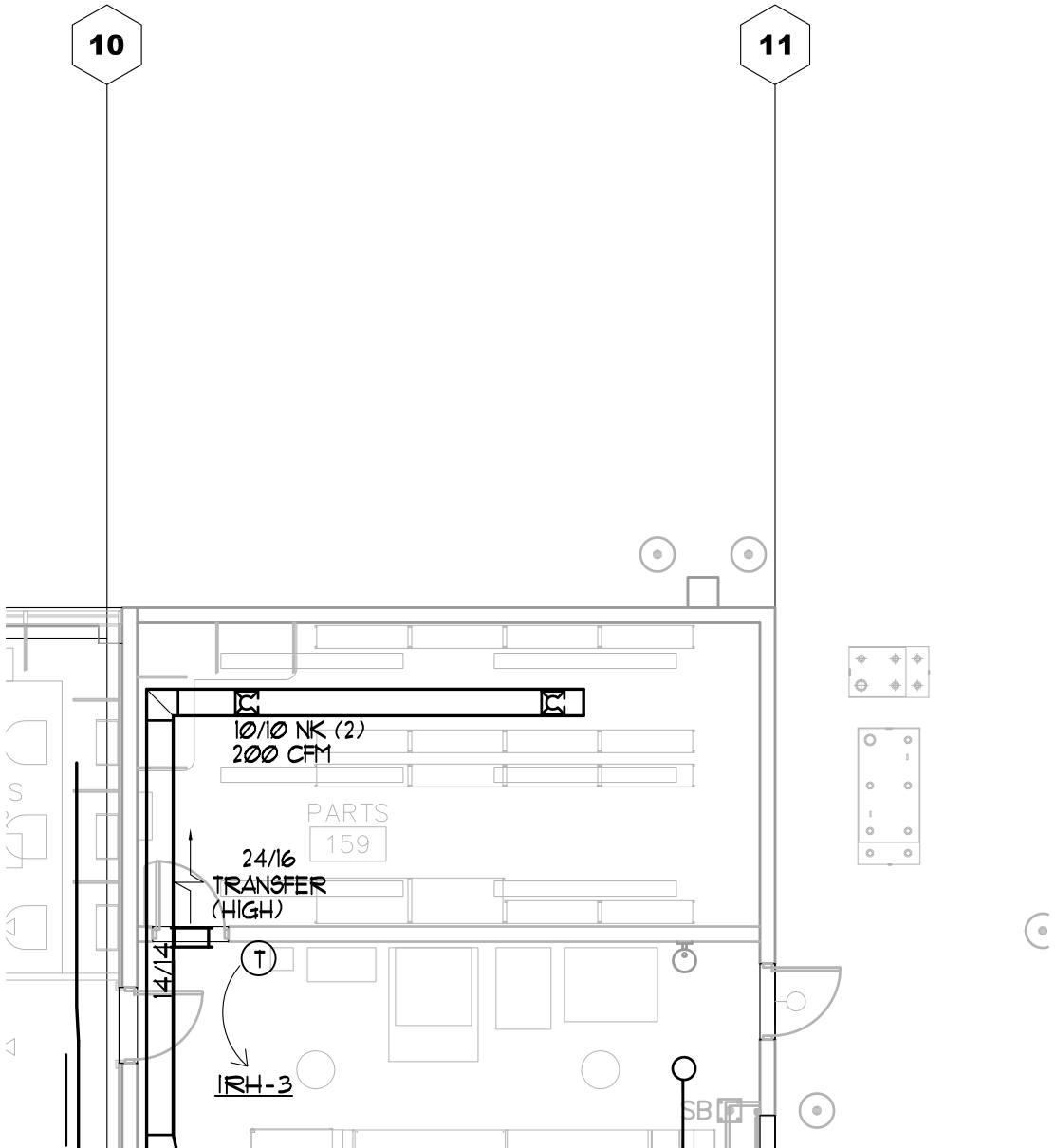
Asset: EF8 AREA:

Unit Data		
	Design	**Actual**
MFG	NA	COOK
Model Num	NA	120 ACRU
Serial Num	-	012S914536-00
Type	-	UPBLAST
Configuration	VERTICAL	VERTICAL

Motor Data		
	Design	**Actual**
Motor MFG	-	MARATHON
Frame	-	48Z
Horsepower	-	0.25
Motor Rpm	-	1755
Phase	-	1
Voltage (rated)	-	115
Amperage (rated)	-	6.1

Test Data		
	Design	**Actual**
CFM	800	834
Fan RPM	-	1334
Fan Rotation	-	CORRECT
Motor RPM	-	1761
System SetPt	-	4 TURNS OPEN
Total ESP	-	-0.305"
Fan Inlet SP	-	
Fan Discharge SP	-	

Completed By: Michael McDonnell on 11/29/2023


10
11
10/10 NK (2)
200 CFM
PARTS
159
24/16
TRANSFER
(HIGH)
14/14
T
IRH-3
SB

HVAC GENERAL NOTES

1. ALL CONTROL WIRING SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITION OF N.F.P.A. 70. ALL WIRING SHALL BE CONCEALED.
2. CONTRACTOR SHALL INSTALL ALL ROOF CURBS FOR ROOFTOP UNITS LEVEL TO HORIZON AT (4) CORNERS.
3. AIR TEST AND BALANCE REQUIRED BY INDEPENDENT T&B CONTRACTOR AABC OR NEBB CERTIFIED. SEE TEST AND BALANCE SCOPE ON THIS SHEET
4. EXISTING SMOKE DETECTORS TO REMAIN AND BE REUSED.
5. LENNOX START UP TECH SHALL PROGRAM THE PRODIGY BOARDS IN ALL NEW RTU'S. PRODIGY BOARDS SHALL BE PROGRAMMED PRIOR TO CSUSA RECOMMISSIONING THE NOVAR SYSTEM.
6. CONTRACTOR SHALL PROVIDE CLEAN FILTERS IN ROOFTOP UNITS PRIOR TO AIR BALANCE AND AGAIN PRIOR TO OWNER ACCEPTANCE.
7. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE 2015 INTERNATIONAL MECHANICAL CODE AND THE 2015 INTERNATIONAL FUEL GAS CODE WITH LOCAL AMENDMENTS. ALL EQUIPMENT AND MATERIALS CAPABLE OF BEING U.L. LABELED OR LISTED SHALL BEAR THE U.L. LABEL.
8. CONTRACTOR SHALL PROVIDE A GASKET BETWEEN BASE OF ROOF MOUNTED FANS AND ROOF CURBS TO PROVIDE AN AIRTIGHT JOINT.
9. PROVIDE MISCELLANEOUS STEEL AND/OR WOOD BLOCKING AND SUPPORT AT ROOF CURBS AND OPENINGS AS REQUIRED TO SUPPORT ROOF AND EQUIPMENT. SPECIFIC REQUIREMENTS SHALL BE VERIFIED WITH STRUCTURAL ENGINEER AND APPROVED EQUIPMENT DRAWINGS PRIOR TO PLACEMENT.
10. NEW SUPPY AND EXHAUST DUCT SHALL BE 2.0 IN PRESSURE CLASS.
11. NEW DUCT SHALL HAVE PAINT GRIP FINISH AND BE EITHER GALVANNEALED OR MILL PHOSPHATIZED.
12. ANY NEW SUPPLY DUCT SHALL BE INTERNALLY INSULATED WITH 1" DUCT LINER EQUAL

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EXISTING PANELBOARD PP SCHEDULE

VOLTAGE: 480/277V, 3 PH, 4 W | MAINS: MAIN LUGS ONLY | MOUNTING: SURFACE | REMARKS:

BUS SIZE: 400A | TOTAL LOAD: 161.0 KVA (DIVERSIFIED LOAD) | FAULT DUTY: 42,000 A

NO	SERVES	NOTE	LOAD (KVA) LTG	RCPT	MTR	A/C	HTG	MISC	BRKR TRIP	P	PHASE A	PHASE B	PHASE C	P	BRKR TRIP	MISC	LOAD (KVA) HTG	A/C	MTR	RCPT	LTG	NOTE	SERVES	NO
1	RTU-1					26.1			35	3				3	15			6.9					RTU-3	2
3	RTU-1					--			--	-				-	--			--					RTU-3	4
5	RTU-1					--			--	-				-	--			--					RTU-3	6
7	RTU-2					26.1			35	3				3	20			10.2					RTU-4	8
9	RTU-2					--			--	-				-	--			--					RTU-4	10
11	RTU-2					--			--	-				-	--			--					RTU-4	12
13	SPACE													3	15			6.9					RTU-5	14
15	SPACE													-	--			--					RTU-5	16
17	SPACE													-	--			--					RTU-5	18
19	SPACE													3	15			6.9					RTU-6	20
21	SPACE													-	--			--					RTU-6	22
23	SPACE													-	--			--					RTU-6	24
25	SPACE													3	15			6.9					RTU-7	26
27	SPACE													-	--			--					RTU-7	28
29	SPACE													-	--			--					RTU-7	30
31	SPACE													3	15			9.0					RTU-8	32
33	SPACE													-	--			--					RTU-8	34
35	SPACE													-	--			--					RTU-8	36
37	AIR COMPRESSOR					28.3			60	3				3	50			33.7					RTU-9	38
39	AIR COMPRESSOR					--			--	-				-	--			--					RTU-9	40
41	AIR COMPRESSOR					--			--	-				-	--			--					RTU-9	42

LOAD SUMMARY | LIGHTING: 0.0 KVA | A/C: 132.7 KVA
CURRENT: | RECEPTACLE: 0.0 KVA | HEATING: 0.0 KVA
193.7 AMPS | MOTOR: 28.3 KVA | MISC: 0.0 KVA

LOAD ON EXISTING PANEL "PP" HAS DECREASED BY 35.0 KVA/ 42.1 AMPS DUE TO THE REPLACEMENT OF (5) ROOF TOP UNITS. THIS PANEL HAS A TOTAL AMPERAGE OF 193.7 AMPS.

NOTE: PANEL PP IS SERVED FROM A 400A/3P BREAKER IN PANEL BOARD MDP.

KEYED ELECTRICAL NOTES PANELBOARD:

(A) REMOVE EXISTING 50A/3P CIRCUIT BREAKER, INSTALL NEW 35A/3P CIRCUIT BREAKER.

(B) EXISTING 15A/3P CIRCUIT BREAKER,TO REMAIN AND BE REUSED.

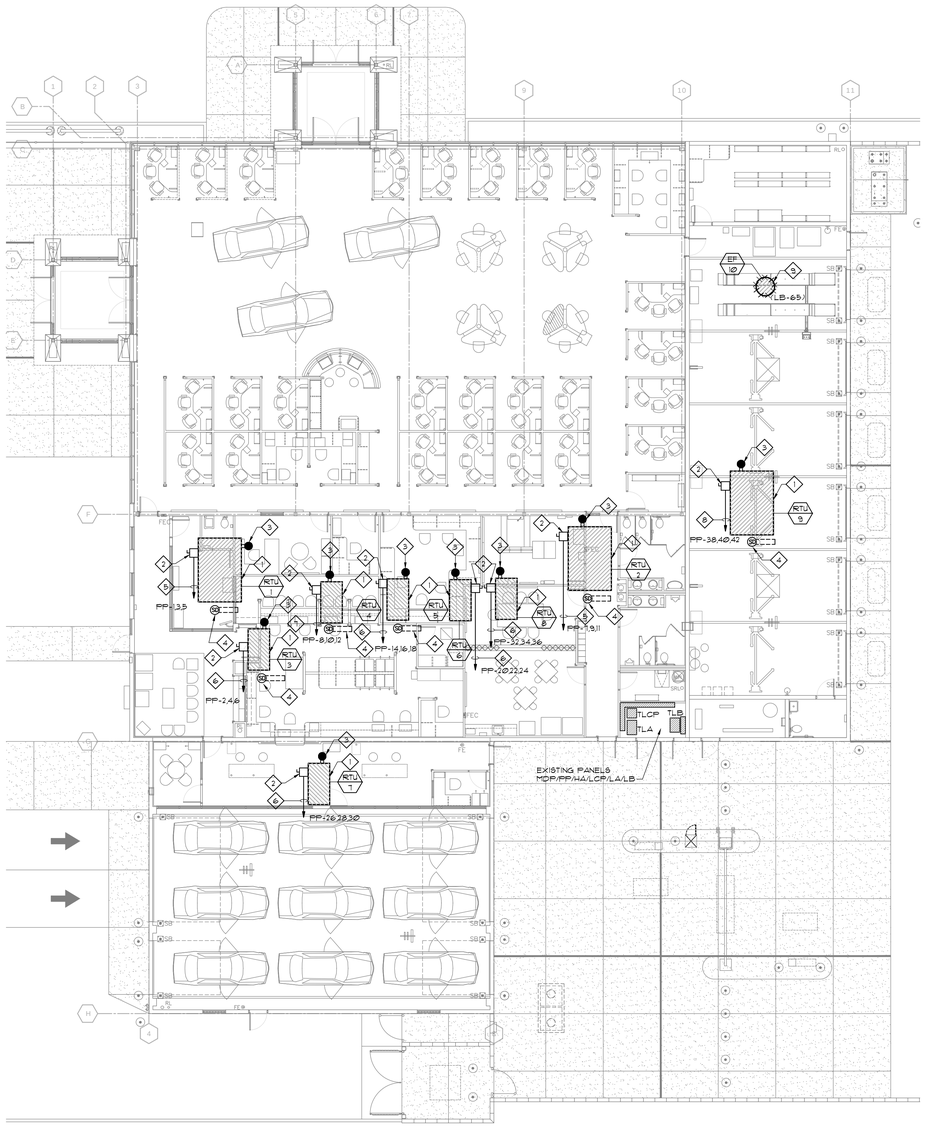
(C) EXISTING 20A/3P CIRCUIT BREAKER,TO REMAIN AND BE REUSED.

(D) REMOVE EXISTING 60A/3P CIRCUIT BREAKER, INSTALL NEW 50A/3P CIRCUIT BREAKER.

(E) EXISTING AIR COMPRESSOR TO REMAIN

CIRCUIT BREAKER NOTE:

ALL NEW AND REPLACED CIRCUIT BREAKERS SHALL BE HACR TYPE AND SHALL MATCH THE MANUFACTURER OF EACH EXISTING PANEL AND MATCH THE AIC RATING OF EXISTING CIRCUIT BREAKERS IN EACH PANEL.



1 / E1.0 MECHANICAL/PLUMBING EQUIPMENT CONNECTION PLAN

SCALE: 3/32" = 1'-0"

GENERAL NOTES:

1. ALL LINE VOLTAGE WIRING & CONDUIT IS FURNISHED & INSTALLED BY ELECTRICAL CONTRACTOR.
2. ROUTE ALL CONDUITS INSIDE ROOF CURBS. NO CONDUITS SHALL PENETRATE THROUGH ROOF DECK.
3. WHERE NEW CIRCUIT BREAKERS ARE INSTALLED IN EXISTING PANELBOARDS, NEW CIRCUIT BREAKER SHALL MATCH MANUFACTURER & A.I.C. RATING OF EXISTING CIRCUIT BREAKERS CURRENTLY IN PANELBOARD.
4. FIELD VERIFY ALL EXISTING CIRCUIT NUMBERS CURRENTLY SERVING EQUIPMENT BEING REPLACED.
5. RE-CONNECT ALL TEMPERTURE SENSORS TO EACH NEW ROOF TOP UNIT WITH EXISTING LOW VOLTAGE CABLE. PROVIDE NEW LOW VOLTAGE CABLE TO MATCH EXISTING CABLE IF DEFECTIVE.
6. RE-CONNECT EXISTING REMOTE TEST SWITCH CABLING TO EACH ROOF TOP UNIT WHERE EXISTING TEST SWITCHES ARE CURRENTLY INSTALLED.
7. IF CONDUCTOR LENGTH TO NEW R.T.U.'s NEED TO BE EXTENDED, CONTRACTOR SHALL SPLICE EXISTING CONDUCTORS TO NEW CONDUCTOR OF SAME SIZE. SPLICE SHALL OCCUR IN A J-BOX LOCATED DIRECTLY BELOW ROOF DECK NEAR AFFECTED R.T.U..
8. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDUCTOR SIZES SPECIFIED IN LEGEND NOTES AND RECONNECT EXACT SIZE CONDUCTORS SPECIFIED. IN THE EVENT CONDUCTORS SPECIFIED ARE SMALLER THAN INDICATED IN LEGEND NOTES, CONTRACTOR SHALL INSTALL NEW CONDUCTORS TO MATCH SPECIFIED CONDUCTORS STATED IN LEGEND NOTES.
9. TEST ENTIRE FIRE ALARM SYSTEM AT COMPLETION OF FIRE ALARM WORK AND MAKE ALL REQUIRED REPAIRS TO MAKE THE FIRE ALARM SYSTEM FULLY OPERATIONAL. PROVIDE A FIRE ALARM LOW VOLTAGE CONTRACTOR TO PERFORM TESTING OR THE FIRE ALARM MANUFACTURERS REPRESENTATIVE.

LEGEND NOTES:

1. NEW ROOF TOP UNIT BEING INSTALLED AT SAME LOCATION AS EXISTING ROOF TOP UNIT BEING REMOVED.
2. FACTORY INSTALLED DISCONNECT SWITCH INTEGRAL TO ROOF TOP UNIT. MAKE CONDUCTOR CONNECTIONS TO DISCONNECT SWITCH. VERIFY DISCONNECT SWITCH LOCATION AT EACH R.T.U.
3. FACTORY INSTALLED G.F.C.I. WEATHERPROOF RECEPTACLE INTEGRAL TO ROOF TOP UNIT. CONNECT RECEPTACLE TO EXISTING ROOF TOP UNIT RECEPTACLE CIRCUIT.
4. EXISTING DUCT MOUNTED SMOKE DETECTOR INSTALLED IN DUCTWORK (VERIFY DUCT DETECTOR IS FULLY OPERATIONAL). DUCT DETECTOR MAY BE REUSED IF FULLY OPERATIONAL. IF EXISTING DUCT DETECTOR IS NOT FULLY OPERATIONAL, FURNISH AND INSTALL NEW DUCT MOUNTED SMOKE DETECTOR IN DUCTWORK AND CONNECT TO FIRE ALARM PANEL AND RTU. NEW DUCT MOUNTED SMOKE DETECTOR TO MATCH MANUFACTURER OF EXISTING FIRE ALARM SYSTEM.
5. RECONNECT EXISTING 3 #6 & 1 #10G TO NEW R.T.U., REPLACE EXISTING 50A/3P CIRCUIT BREAKER IN PANEL "PP" WITH NEW 35A/3P CIRCUIT BREAKER AND MAKE FINAL CONNECTION AT NEW CIRCUIT BREAKER. EXTEND/SPLICE CONDUCTOR LENGTH TO REACH NEW R.T.U. IF REQUIRED.
6. RECONNECT EXISTING 3 #12 & 1 #12G TO NEW R.T.U., REUSE EXISTING 15A/3P CIRCUIT BREAKER IN PANEL "PP"AND MAKE FINAL CONNECTION AT EXISTING CIRCUIT BREAKER. EXTEND/SPLICE CONDUCTOR LENGTH TO REACH NEW R.T.U. IF REQUIRED.
7. RECONNECT EXISTING 3 #12 & 1 #12G TO NEW R.T.U., REUSE EXISTING 20A/3P CIRCUIT BREAKER IN PANEL "PP"AND MAKE FINAL CONNECTION AT EXISTING CIRCUIT BREAKER. EXTEND/SPLICE CONDUCTOR LENGTH TO REACH NEW R.T.U. IF REQUIRED.
8. RECONNECT EXISTING 3 #4 & 1 #8G TO NEW R.T.U., REPLACE EXISTING 60A/3P CIRCUIT BREAKER IN PANEL "PP" WITH NEW 50A/3P CIRCUIT BREAKER AND MAKE FINAL CONNECTION AT NEW CIRCUIT BREAKER. EXTEND/SPLICE CONDUCTOR LENGTH TO REACH NEW R.T.U. IF REQUIRED.
9. EXHAUST FAN IS BEING REMOVED/DELETED. REMOVE BRANCH CIRCUIT CONDUCTORS BACK TO CIRCUIT BREAKER IN PANEL LB. CIRCUIT SHOWN IN PARENTHESES. UPDATE PANELBOARD DIRECTORY AND MARK AS SPARE.

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WISCONSIN WAYNE D OWEN 48577-6 PROFESSIONAL ENGINEER

SUBMISSION

RELEASED FOR CONSTRUCTION

APPROVAL

CARMAX PE

REVISIONS

REV. NO	DATE	DESCRIPTION

CARMAX
THE AUTO SUPERSTORE
CARMAX, THE AUTO SUPERSTORE, INC.
12800 TUCKAHOE CREEK PKWY RICHMOND, VA 23238
(804) 747-0422
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2441 KOSSOW ROAD
WAUKESHA, WISCONSIN 53186

PROJECT NO	22216.01
DATE	4 MAR 2022
SHEET TITLE	MECHANICAL/PLUMBING EQUIPMENT CONNECTION PLAN
SHEET NO	E1.0