AIR-DEX

DIV. OF S&S TOOL & MACHINE - LOU. KY.

AIR-DEX CNC TURRET

MODEL AMS-8

OPERATION AND SERVICE GUIDE

REV 08-27-98

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SECTION I

PRINCIPLE OF OPERATION

A

THE AIR-DEX MODEL AMS-8 TOOL TURRET IS AN ELECTRICALLY CONTROLLED, PNEUMATICALLY POWERED INDEXING MECHANISM DESIGNED TO ALLOW RANDOM SELECTION OF CUTTING TOOLS ON TURNING MACHINES. DURING CUTTING OPERATIONS, THE TURRET IS HELD RIGIDLY IN POSITION BY ENGAGING MATCHING TAPERED TOOTH COUPLING RINGS USING INTERNAL SPRINGS. THIS ARRANGEMENT PROVIDES POSITIVE TOOL POSITIONING IN THE CASE OF AIR PRESSURE LOSS.

THE GENERAL PRINCIPLE OF OPERATION IS TO OVERCOME THE CLAMPING SPRINGS USING AN INTERNAL PISTON ATTACHED TO THE SPINDLE. AIR PRESSURE IS APPLIED TO THE PISTON CAUSING THE SPINDLE AND THE TURRET DISC TO ADVANCE FORWARD AND DISENGAGE THE COUPLING RING TEETH WHILE SIMULTANEOUSLY ENGAGING AN INTERNAL CLUTCH TO CONNECT THE WORM GEAR DRIVE AND MOTOR. THE PRE-LOCATING SHOT PIN IS THEN RETRACTED FROM THE INDEX/CODE PLATE AND THE AIR MOTOR IS STARTED TO ROTATE CLOCKWISE OR COUNTER-CLOCKWISE, INDEXING THE TURRET DISC TO THE TOOL STATION SELECTED, VIA THE SHORTEST PATH. SENSORS MOUNTED IN THE END CAP OF THE HOUSING ARE USED TO MONITOR THE TURRET POSITION AND SUPPLY A REVERSE B.C.D. CODE BACK TO THE CONTROL. WHEN THE SELECTED POSITION IS APPROACHING, THE AIR MOTOR IS SHIFTED TO THE SLOW SPEED SETTING AND THE SHOT PIN IS RE-ENGAGED TO PRE-POSITION THE TURRET DISC AND COUPLING RING TEETH FOR RE-ENGAGEMENT. WHEN THE TURRET IS AT THE EXACT LOCATION SELECTED THE AIR IS RELEASED FROM THE INTERNAL PISTON, ALLOWING THE SPRINGS TO POSITIVELY LOCATE AND CLAMP THE TURRET. THE INTERNAL DRIVE CLUTCH IS NOW DIS-ENGAGED AND ALL EXTERNAL FORCES ARE REMOVED FROM THE AIR-DEX ASSEMBLY ALLOWING THE TOOTHED COUPLING RING TO ACHIEVE MAXIMUM ACCURACY AND REPEATIBILITY.

B

SEE THE FOLLOWING DIAGRAMS FOR COMPONENT ARRANGEMENT.

DIAGRAM I ---------- SIDE VIEW CROSS SECTION

DIAGRAM II ---------- REAR VIEW CROSS SECTION

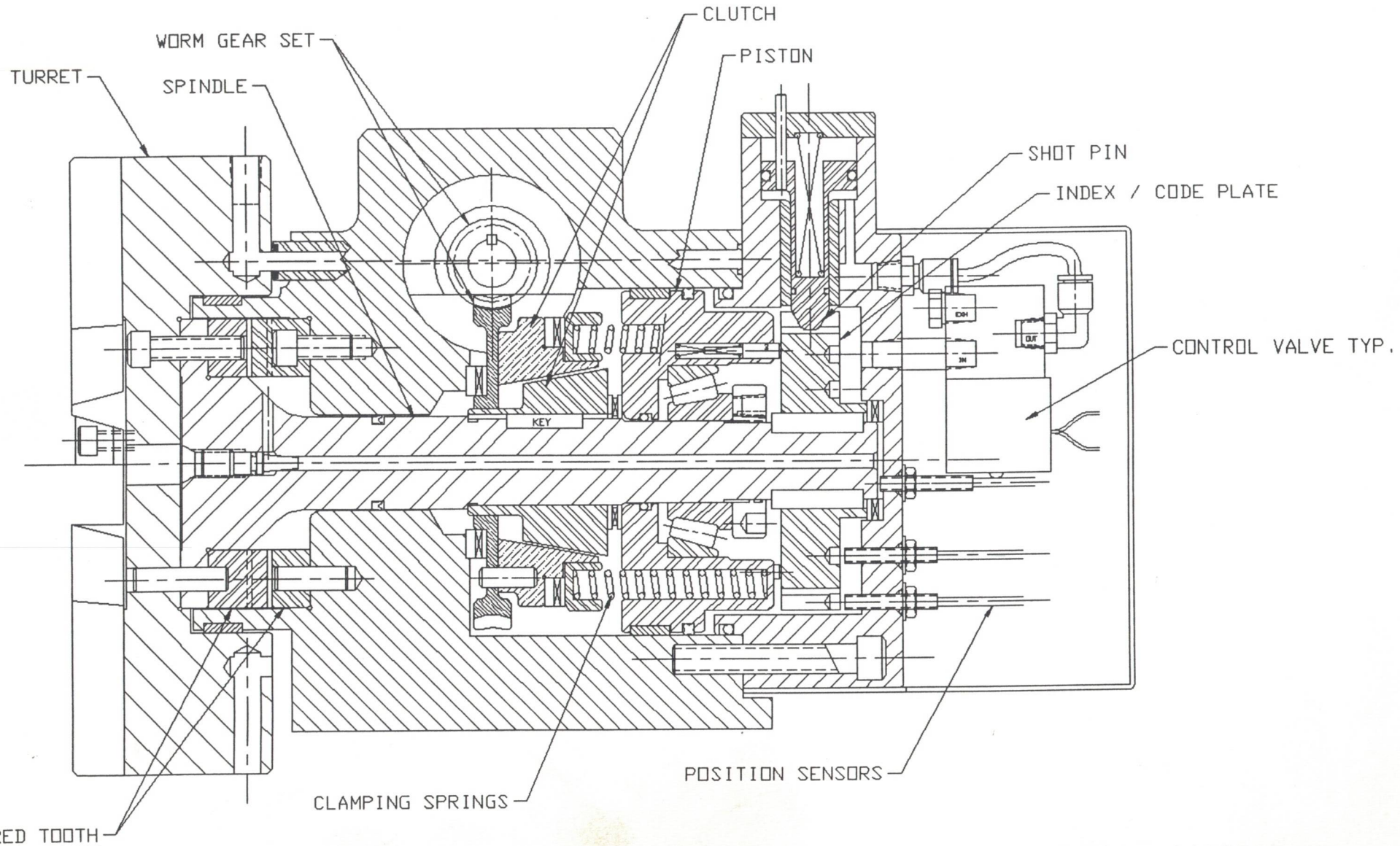

CLUTCH
WORM GEAR SET
PISTON
TURRET
SPINDLE
SHOT PIN
INDEX / CODE PLATE
CONTROL VALVE TYP.
KEY
POSITION SENSORS
CLAMPING SPRINGS
TAPERED TOOTH
COUPLING RINGS

DIAGRAM 1

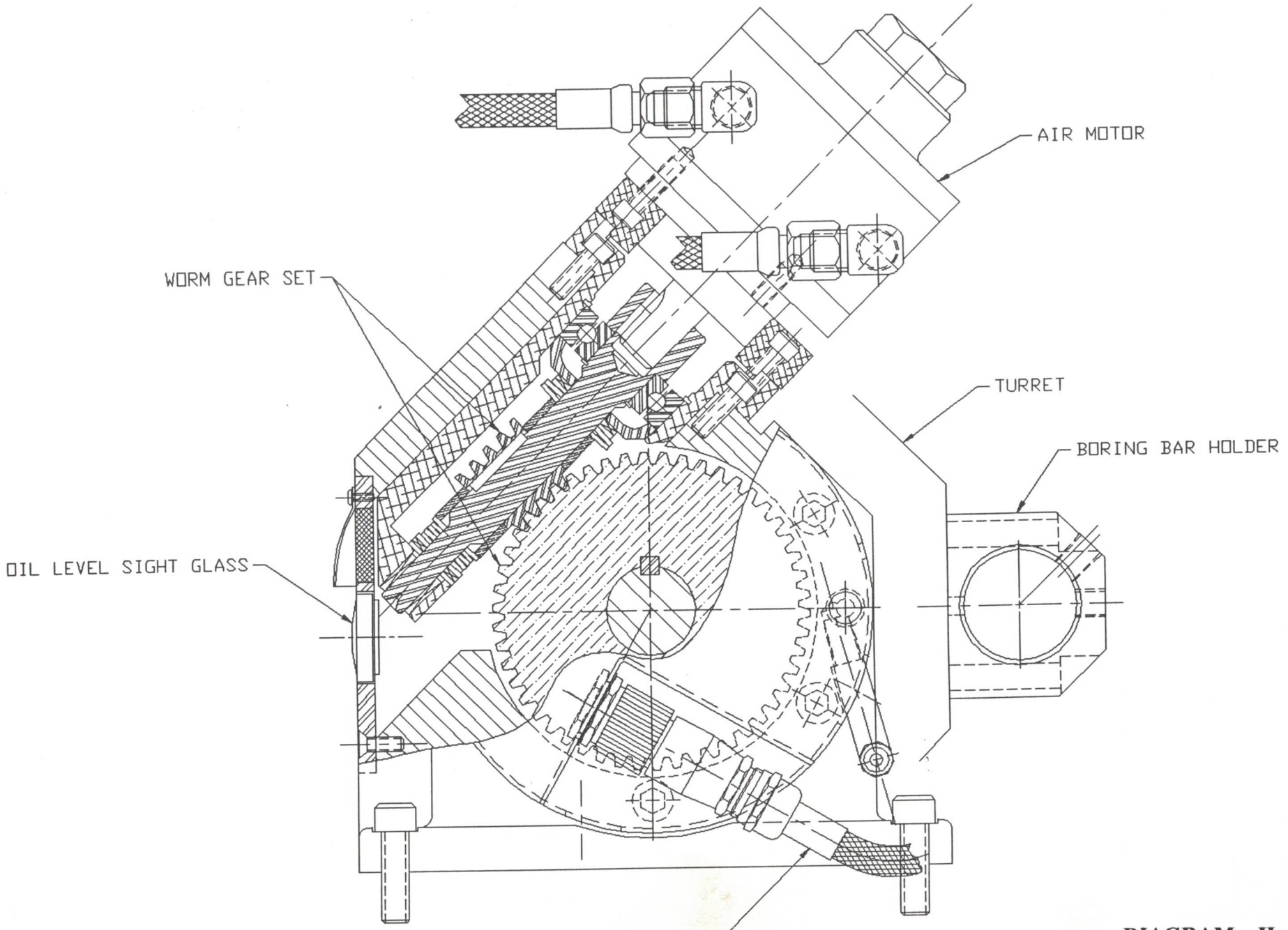

AIR MOTOR
WORM GEAR SET
TURRET
BORING BAR HOLDER
OIL LEVEL SIGHT GLASS

DIAGRAM - II

SECTION II

GENERAL DATA

A) STANDARD EQUIPMENT SUPPLIED BY AIR-DEX.

(1) AIR-DEX TURRET ASSEMBLY MODEL # AMS-8

(3) 1 ½" I.D. BORING BAR HOLDERS

(4) BORING BAR HOLDER REDUCTION SLEEVES

(8) TURNING TOOL LOCKING WEDGES

(8) COOLANT NOZZLE ASSEMBLIES

(1) STAINLESS STEEL BRAIDED COOLANT SUPPLY LINE

(1) AIR REGULATOR/FILTER

(1) AIR SHUT OFF VALVE WITH LOCK OUT

(1) IN-LINE-LUBRICATOR

(2) STAINLESS STEEL BRAIDED AIR MOTOR SUPPLY LINES

(1) STAINLESS STEEL BRAIDED TURRET AIR SUPPLY LINE

(1) PLASTIC MAIN AIR SUPPLY LINE

(1) ADAPTER PLATE

(1) STAINLESS STEEL BRAIDED LOGIC CABLE

(1) MOTOR CONTROL VALVE ASSEMBLY WITH CONTROL CABLES

(1) LOT OF MOUNTING HARDWARE

NOTE: MOUNTING HARDWARE, GUARDS, AND INSTALLATION EQUIPMENT MAY BE SUPPLIED IN ADDITION TO THE ABOVE LIST, AND WILL BE DETERMINED BY THE LATHE MANUFACTURER.

B) SPECIFICATIONS

TOOL STATIONS: ---------- 8
(turning and boring)

TOOL CAPACITY: TURNING TOOLS ---------- ¾" SQ
BORING TOOLS ---------- 1 ½" DIA.

THRU TOOL COOLANT ---------- STD

INDEXING ACCURACY: ---------- 10 ARC SEC

INDEXING REPEATABILITY: ---------- 0.0001"

POSITION ACCURACY / AXIS: ---------- 0.005"
(at boring bar holder)

INDEX TIME: ---------- APPROX. 1 SEC.

OPERATION: ---------- CNC

AIR PRESSURE REQUIRED: ---------- 75 TO 85 PSI

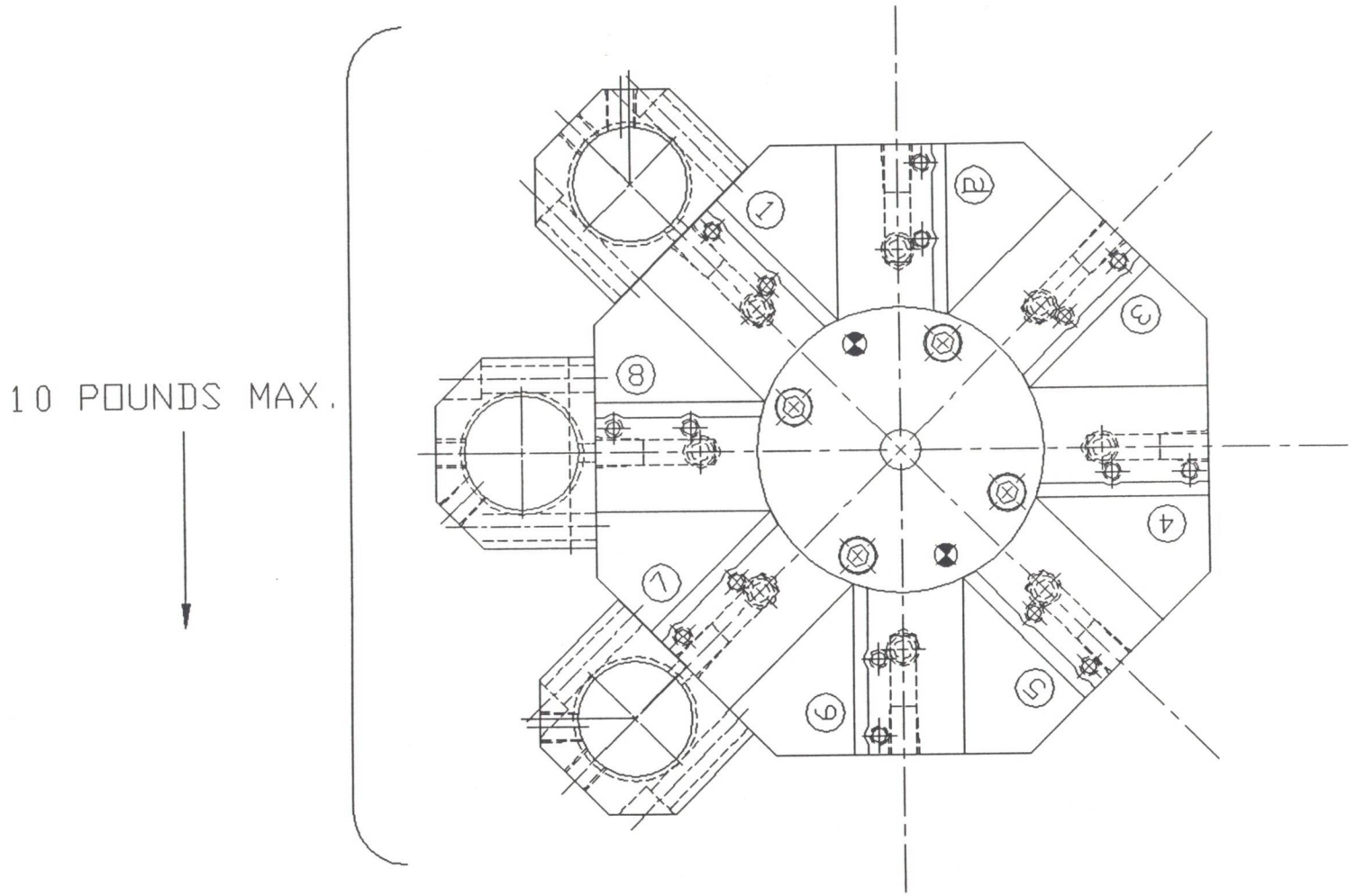
CFM REQUIRED: ---------- 20 TO 25

ELECTRICAL: ---------- 24 VOLT DC

MAXIMUM OUT OF BALANCE
POSITION OF TOOLS: ---------- 10 POUNDS
(see figure 1)

C) ESTABLISHING CENTER LINE HEIGHT

ESTABLISHING THE PROPER CENTER LINE HEIGHT IS CRITICAL TO PRODUCING QUALITY PARTS. AIR-DEX SUPPLIES AN ADAPTER PLATE THAT WILL ENABLE THE MOUNTING OF THE TURRET ASSEMBLY DIRECTLY TO THE CROSS SLIDE OF THE LATHE. THE ADAPTER PLATE HAS BEEN PRODUCED WITH GRIND STOCK REMAINING ON THE THICKNESS, SO THAT THE PLATE CAN BE MATCHED FIT TO THE LATHE IN THE FIELD. THE CENTER LINE HEIGHT FROM TOP OF CROSS SLIDE TO CENTER OF THE MACHINE SPINDLE WILL VARY FROM MACHINE TO MACHINE REGARDLESS OF THE MANUFACTURER. TO ESTABLISH THE CENTER LINE HEIGHT FOR THE AIR-DEX TURRET TO THE MACHINE, FOLLOW THE EXAMPLE SHOWN ON (figure 2).

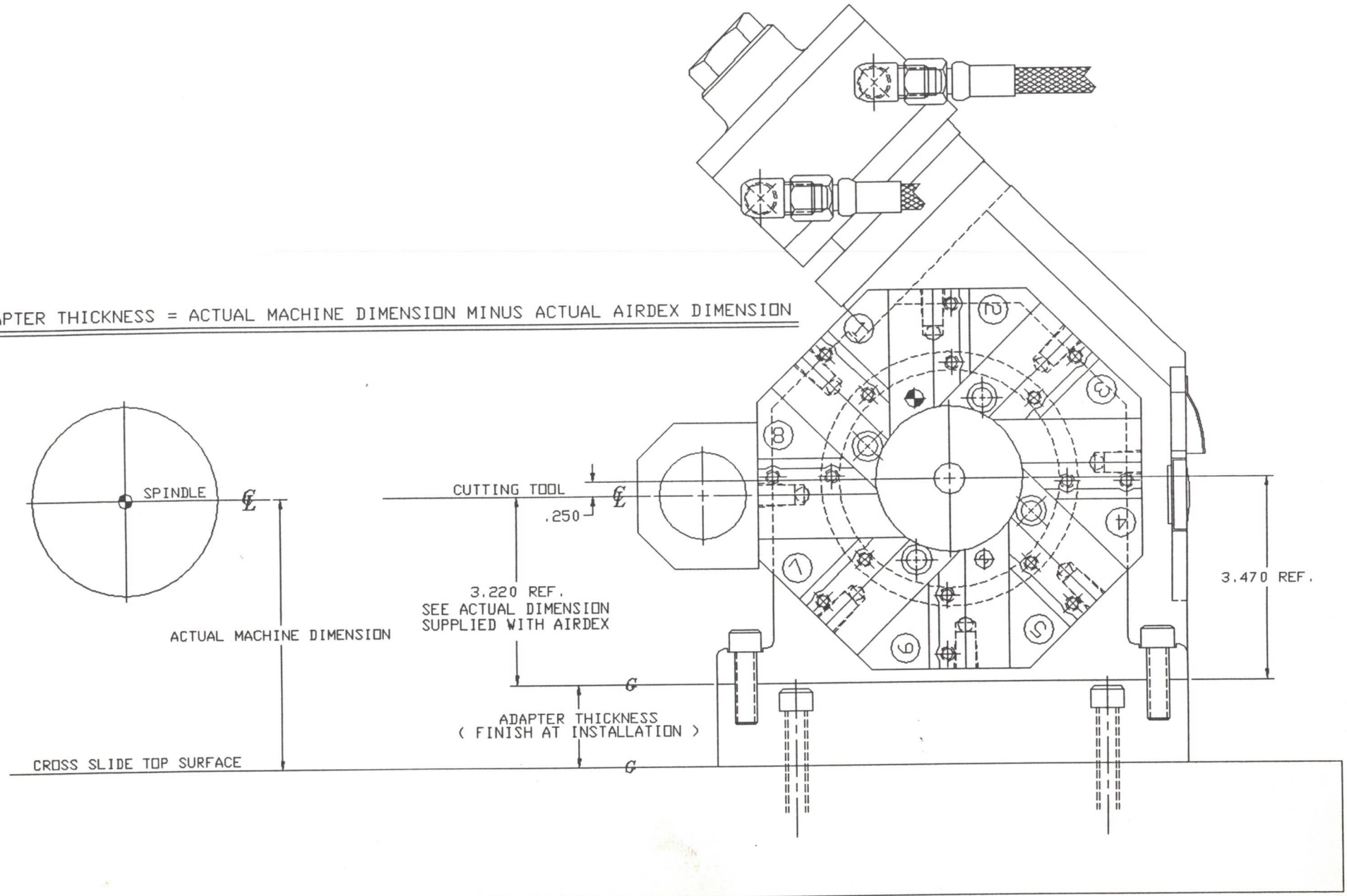


MAXIMUM ECCENTRIC TOOL LOADING

NOTE: EXCESSIVE OUT OF BALANCE CONDITION WILL CAUSE ERRATIC INDEXING

FIGURE 1

ADAPTER THICKNESS = ACTUAL MACHINE DIMENSION MINUS ACTUAL AIRDEX DIMENSION



SECTION III

ELECTRICAL SYSTEM

A) DESCRIPTION OF ELECTRICAL SYSTEM

THE AIR-DEX AMS-8 TURRET IS DESIGNED TO OPERATE ON 24 VOLT DC POWER THAT IS TYPICALLY SUPPLIED BY THE MACHINE CONTROL.

THE AIR-DEX TURRET USES FIVE PROXIMITY SWITCHES LOCATED IN THE REAR OF THE TURRET ASSEMBLY, INSIDE THE GUARD. ONE OF THE PROX SWITCHES IS USED TO SENSE THAT THE TURRET IS CLAMPED. THE OTHER FOUR ARE USED FOR DETERMINING TURRET TOOL POSITION, AND ARE INTERFACED WITH THE MACHINE CONTROL USING BINARY CODED DECIMAL (B.C.D.). THE FOUR SWITCHES ARE READ IN REVERSE OF NORMAL CODE. WE ARE READING ABSENCE RATHER THAN PRESENCE TO DETERMINE TOOL POSITION. THE CODE USED IS SHOWN IN THE BELOW CHART.

TOOL POSITION NUMBER	BCD CODE
X	8 4 2 1
1	1 1 1 0
2	1 1 0 1
3	1 1 0 0
4	1 0 1 1
5	1 0 1 0
6	1 0 0 1
7	1 0 0 0
8	0 1 1 1

BCD CODE CHART

TYPICAL AIRDEX AIRMOTOR TURRET CONTROL OVERVIEW

(BASED ON PLC CONTROL)

Turret I/O Summary

Turret Inputs: (24VDC)

1. Turret Solenoid - controls extending the turret to allow rotation and retracting the turret to lock in place
2. CW Solenoid - rotates turret clockwise
3. CCW Solenoid - rotates turret counter clockwise
4. Slow Solenoid - reduced rotational speed
5. Shot Pin Solenoid - controls shot pin

Turret Outputs: (24VDC)

1. Turret Position 1 - least significant digit of binary turret position
2. Turret Position 2 - 2nd digit of binary turret position
3. Turret Position 4 - 3rd digit of binary turret position
4. Turret Position 8 - most significant digit of binary turret position
5. Turret Locked Prox - indicates that the turret is locked in place

Procedure to rotate AIRDEX air motor turret from a current position to a desired position:

- Verify that the Turret Locked Prox is ON
- Extend the turret by activating the Turret Solenoid
- Delay 650ms to allow the turret to fully extend
- Verify that the Turret Locked Prox is OFF
- Determine which direction to rotate to reach the desired position in the shortest amount of time
  - calculate desired position minus current position and save as difference
  - if $4 \leq$ difference < 8 then rotate clockwise
  - if $0 \leq$ difference < 4 then rotate counter clockwise
  - if $-4 \leq$ difference < 0 then rotate clockwise
  - if $-8 \leq$ difference < -4 then rotate counter clockwise
- Determine the station just before the desired station
  - if clockwise then the position is the desired position minus one
  - if clockwise and the desired position is one then the position is eight
  - if counter clockwise then the position is the desired position plus one
  - if counter clockwise and the desired position is eight then the position is one
- Release the shot pin be activating the Shot Pin Solenoid
- Wait 50 ms and rotate the turret by activating either the CW or CCW Solenoid
- Read the Turret Position until the station just before the desired position is seen
- Slow down the rotation by activating the Slow Solenoid
- Wait 100 ms and then set the shot pin by deactivating the Shot Pin Solenoid
- Read the Turret Position until it matches the desired position for 40ms
- Deactivate ALL solenoids and verify that the Turret Locked Prox is ON

THE TURRET IS HELD IN THE CLAMPED POSITION MECHANICALLY AND IS UNCLAMPED BY A 24 VOLT AIR SOLENOID VALVE, WHICH IS GIVEN A SIGNAL BY THE CONTROLLER FOR A TOOL CHANGE. THIS VALVE AND THE 24 VOLT AIR SOLENOID VALVE USED TO ACTUATE THE SHOT PIN ARE LOCATED INSIDE THE GUARD WITH THE FIVE PROXIMITY SWITCHES. THE LOGIC CABLE IS USED TO CONNECT ALL OF THE ABOVE DISCUSSED ELECTRONICS TO THE CONTROL.

LOCATED DOWN STREAM OF THE IN-LINE-LUBRICATOR ARE THE MOTOR SPEED AND DIRECTIONAL SOLENOID VALVES. THESE ARE ALSO 24 VOLT AND ARE INTERFACED TO THE CONTROL SEPARATELY FROM THE LOGIC CABLE BY INDIVIDUAL POWER CORDS.

SEVERAL LATHE MANUFACTURERS HAVE REQUESTED AN AIR PRESSURE SWITCH TO BE INCLUDED WITH THE PRESSURE REGULATOR AND IF SO EQUIPPED THIS SWITCH SHOULD BE SET TO TRIP AT 40 TO 45 P.S.I.. THIS SWITCH WILL INDICATE AIR SUPPLY FAILURE AND SHOW A FAULT ON THE LATHE CONTROL MONITOR.

B) EXAMPLE OF CONTROL OVERVIEW, ELECTRICAL SCHEMATIC, AND LADDER LOGIC

B1) TURRET CONTROL OVERVIEW

B2) INTERFACE CONTROL OVERVIEW

B3) LOGIC CABLE SCHEMATIC (figure 3)

B4) PANEL SCHEMATIC (figure 4)
(when PLC is used)

B5) LADDER LOGIC (figure 5 pages 1-9)

TYPICAL AIRDEX AIRMOTOR INTERFACE CONTROL OVERVIEW

Interface I/O Summary

Interface Inputs: (24VDC)

1. Input 1 – LSB of the binary desired position
2. Input 2 – Second bit of the binary desired position
3. Input 3 – Third bit of the binary desired position
4. Input 4 – MSB of the binary desired position
5. Go – Signal to go to the desired position

Interface Outputs: (24VDC)

1. Position 1 - least significant digit of binary turret position
2. Position 2 - 2nd digit of binary turret position
3. Position 4 - 3rd digit of binary turret position
4. Position 8 - most significant digit of binary turret position
5. In/Rdy – the turret is in position and ready to receive the next position
6. Working – the turret is rotating to the desired position
7. Fault – Signal that the turret has an error

Procedure to rotate AIRDEX air motor turret from a current position to a desired position:

- Check the In/Rdy output and see if the turret is ready to rotate.
- Select a desired position and place the binary number on Input 1 (LSB), Input 2, Input 3 and Input 4 (MSB)
- Pulse the Go input.
- Working output will turn on and the In/Rdy will turn off. The turret will start to rotate.
- After the desired position is reached the turret will stop and retract. The Working output will turn off and the In/Rdy will turn on.
- Check the turret position via Pos 1 (LSB), Pos 2, Pos 4 and Pos 8 (MSB).

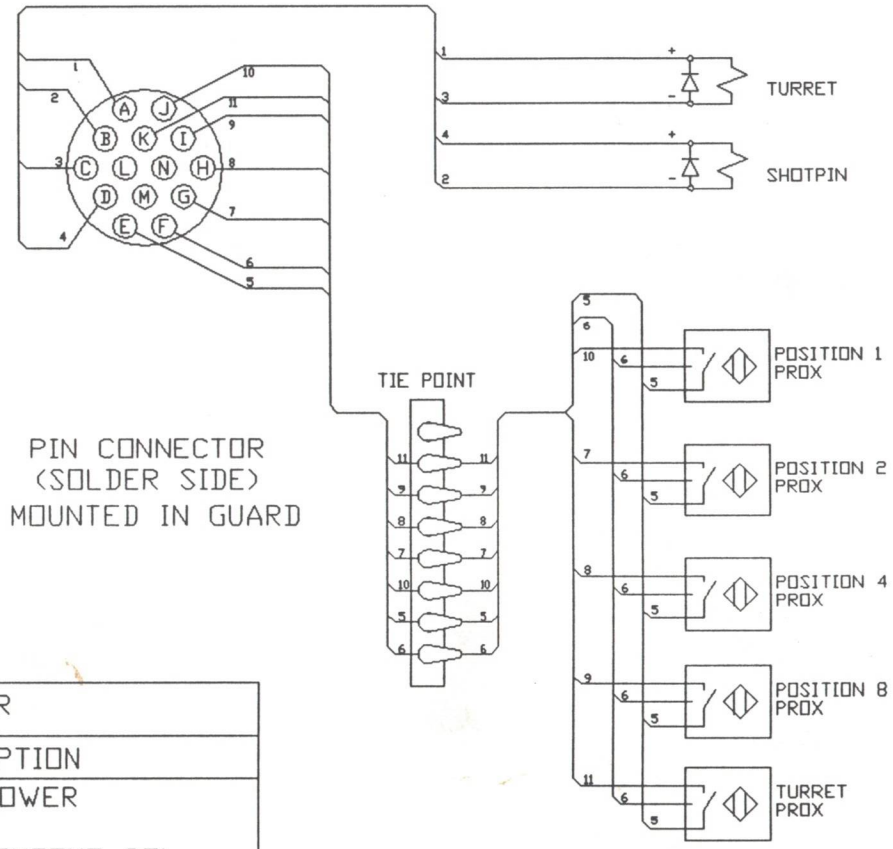
Note: The In/Rdy output will only turn on while the current position and the desired position are equal.

Example:

The current position is 7 and the desired position is 4.

Desired Position	Current Position
Input 1 → 0	Pos 1 → 1
Input 2 → 0	Pos 2 → 1
Input 3 → 1	Pos 4 → 1
Input 4 → 0	Pos 8 → 0

Check the In/Rdy and if it is on then pulse the Go input. The Working output will come on and the In/Rdy will turn off. The turret will extend and rotate. The Current Position will change as follows, in binary, LSB bit bit MSB → 0110, 1010, 0010. When the desired position is reached the turret will retract. The Working output will turn off and the In/Rdy output will turn on.



PIN CONNECTOR
(SOLDER SIDE)
MOUNTED IN GUARD

CONNECTOR	
PIN	DESCRIPTION
1	24VDC POWER
2	GND
3	TURRET EXTENT SOL.
4	SHOTPIN SOL.
5	24VDC POWER
6	GND
7	POSITION 2 PROX SW.
8	POSITION 4 PROX SW.
9	POSITION 8 PROX SW.
10	POSITION 1 PROX SW.
11	TURRET LOCK PROX SW.

DET	QTY	MATERIAL	STOCK SIZE	DESCRIPTION
	1	AMP		CONNECTOR BLOCK
	1	AIRDEX		CONNECTOR
	13	AMP	641300-1	PINS
	15'	ALPHA	1181730C	22 AWG CABLE
	15'	OMEGAFLEX		304 SS BRAIDING
	1	AMPHENOL	9779-513-8	RUBBER BUSHING
	1	AMPHENOL	97-3057-1012	CABLE CLAMP
	1	AMPHENOL	MS3108A-20-27P	SOLID SHELL ANGLE

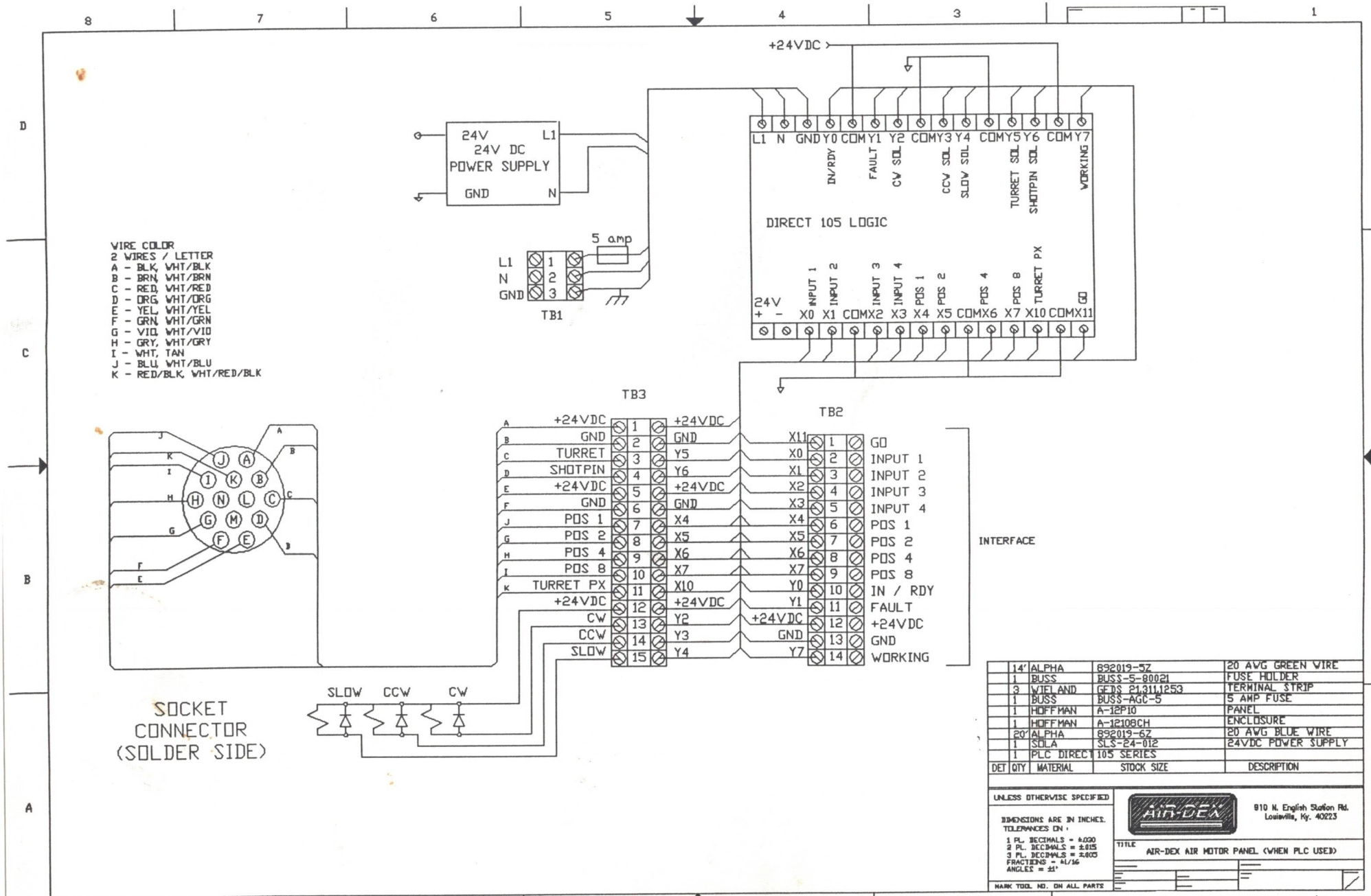
UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES
TOLERANCES ON :
1 PL. DECIMALS = ±.030
2 PL. DECIMALS = ±.015
3 PL. DECIMALS = ±.003
FRACTIONS = ±1/16
ANGLES = ±1°

MARK TOOL NO. ON ALL PARTS

AIR-DEX
810 N. English Station Rd.
Louisville, Ky. 40223

TITLE
AIR-DEX AIR MOTOR CABLE



DET	QTY	MATERIAL	STOCK SIZE	DESCRIPTION
	14'	ALPHA	892019-5Z	20 AWG GREEN WIRE
	1	BUSS	BUSS-S-80021	FUSE HOLDER
	3	WIELAND	GFDS 21.311.1253	TERMINAL STRIP
	1	BUSS	BUSS-AGC-5	5 AMP FUSE
	1	HOFFMAN	A-12P10	PANEL
	1	HOFFMAN	A-12108CH	ENCLOSURE
	20'	ALPHA	892019-6Z	20 AWG BLUE WIRE
	1	SOLA	SLS-24-012	24VDC POWER SUPPLY
	1	PLC DIRECT	105 SERIES	

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES.
TOLERANCES ON :
1 PL. DECIMALS = ±.020
2 PL. DECIMALS = ±.015
3 PL. DECIMALS = ±.005
FRACTIONS = ±1/16
ANGLES = ±1°
MARK TOOL NO. ON ALL PARTS

AIR-DEX
910 N. English Station Rd.
Louisville, Ky. 40223

TITLE
AIR-DEX AIR MOTOR PANEL (WHEN PLC USED)

FIGURE 4

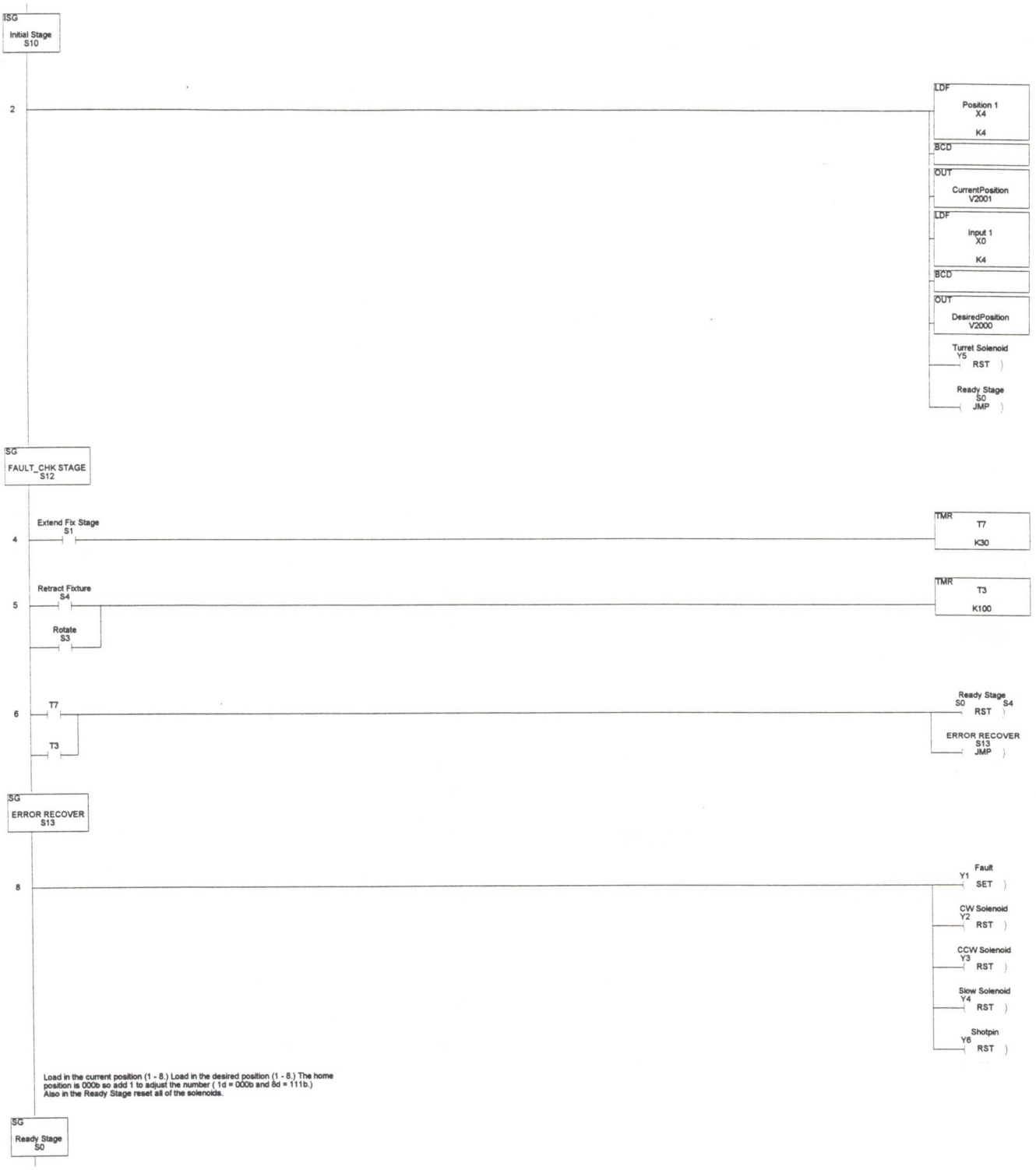
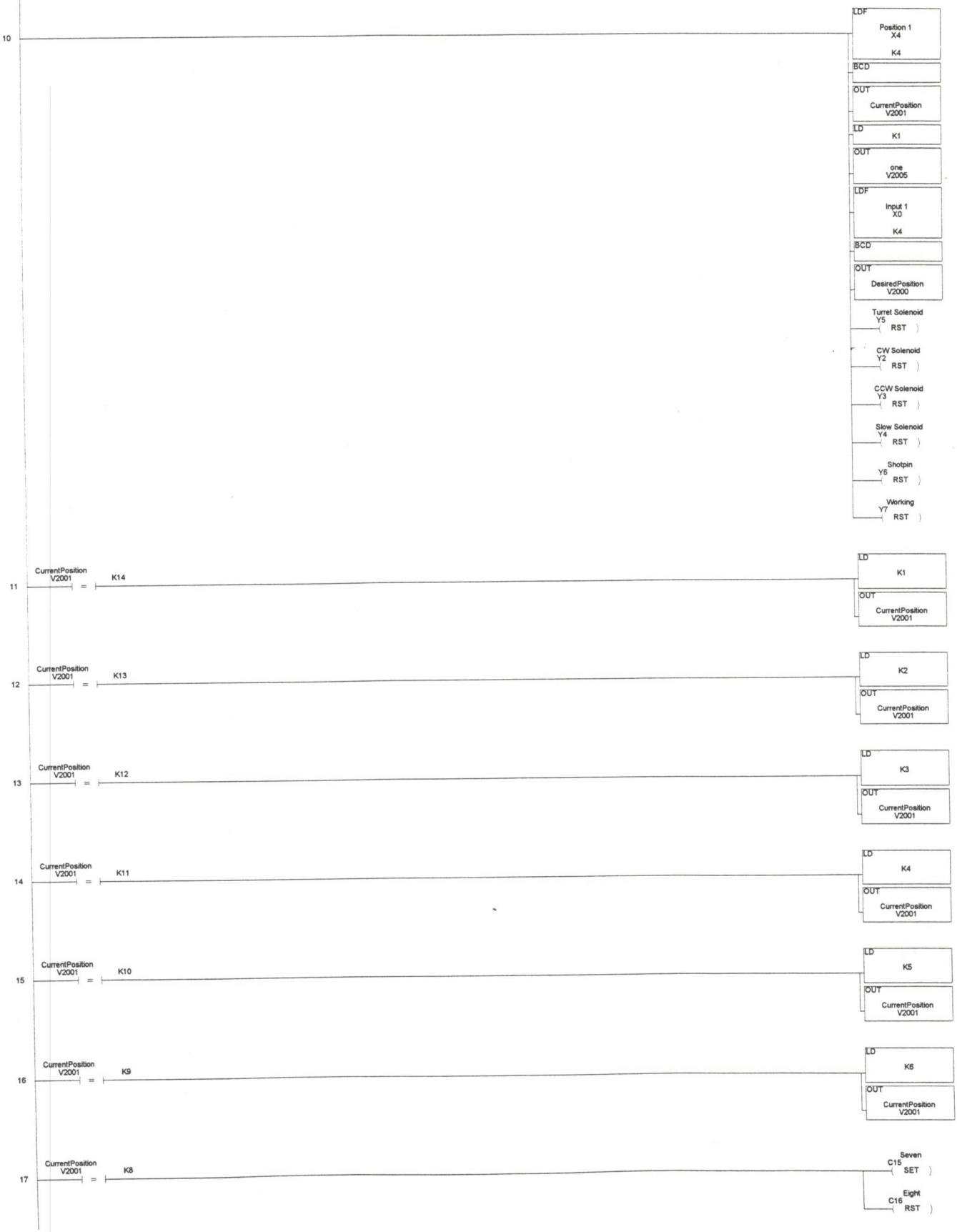
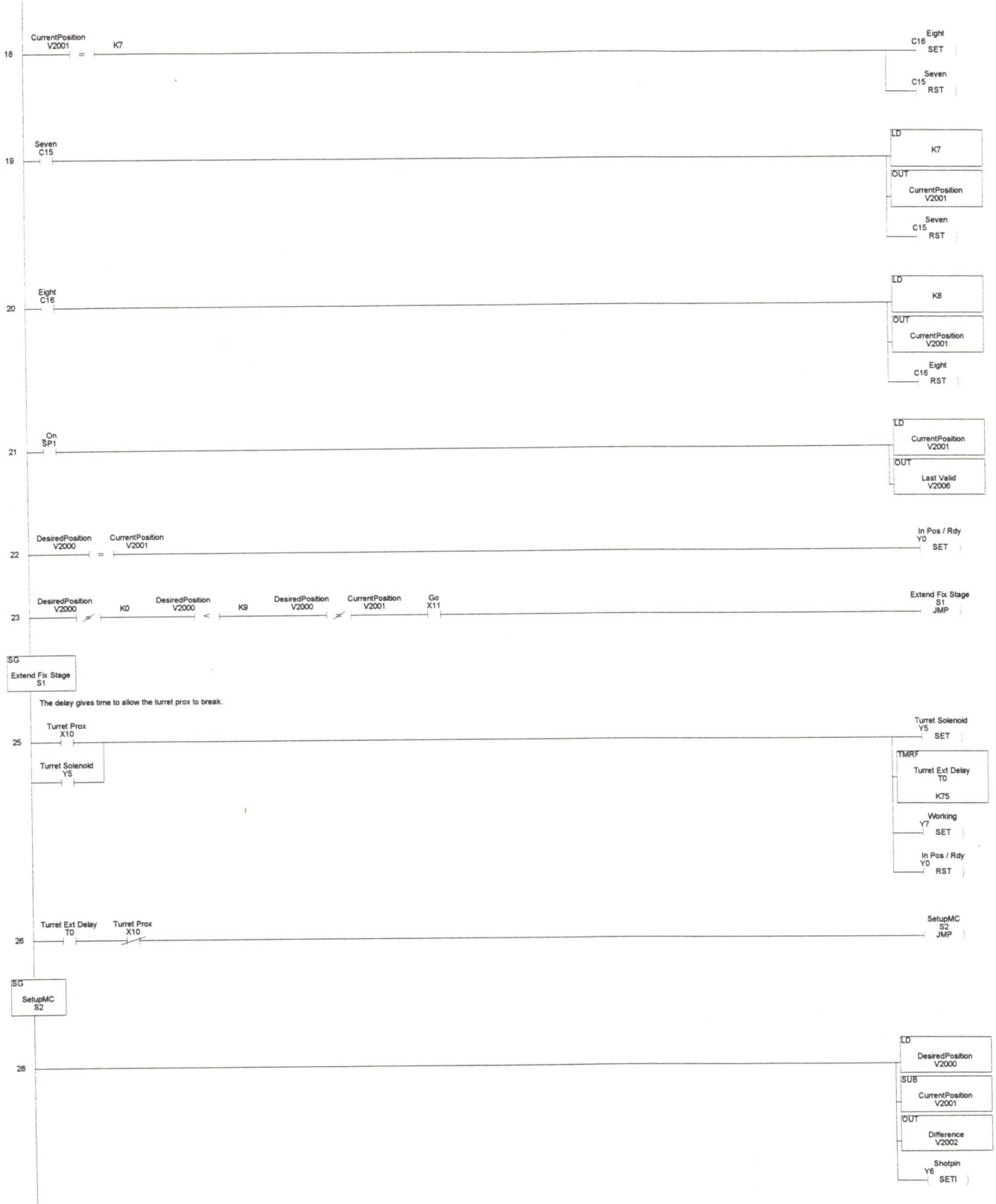
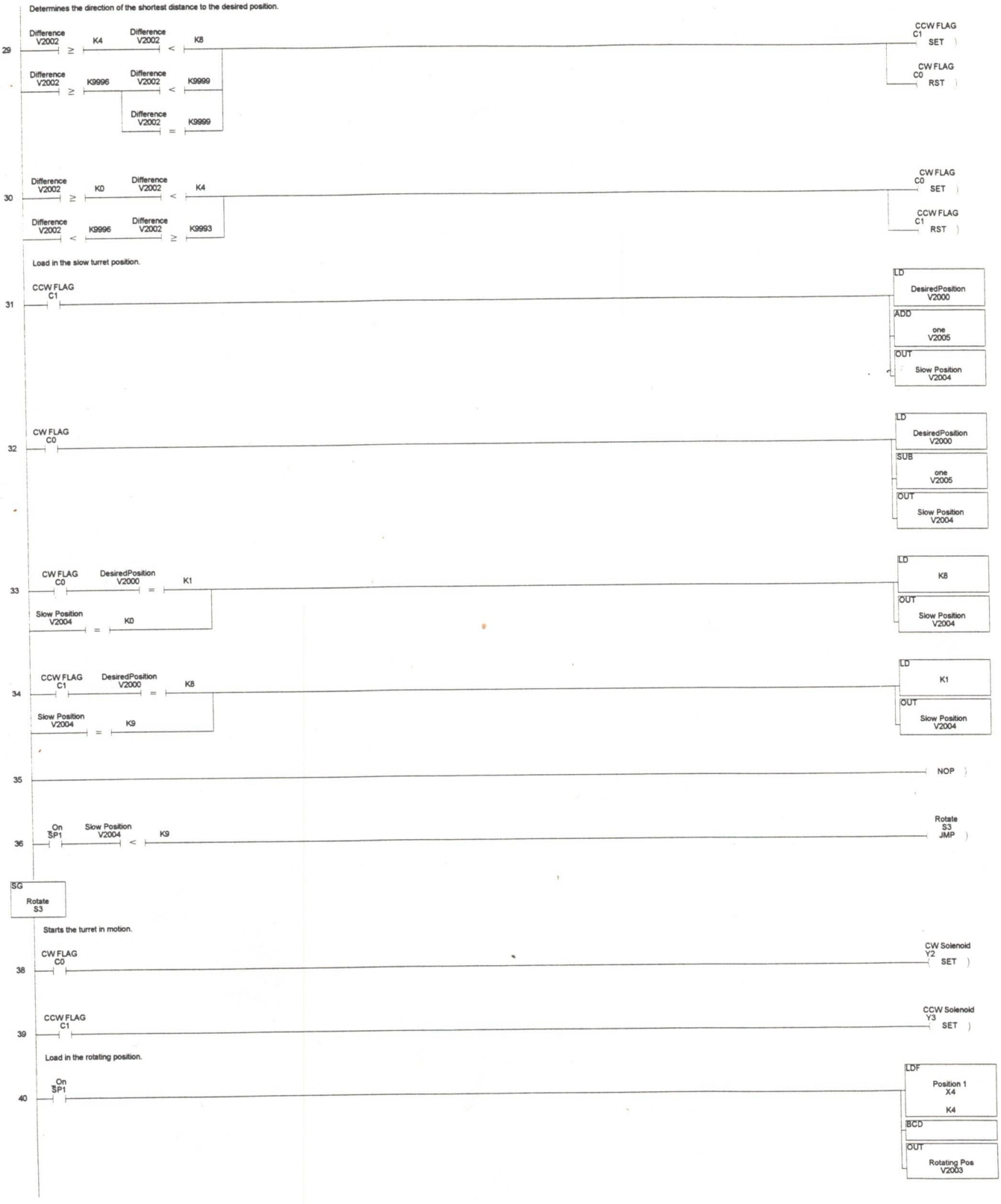

ISG
Initial Stage
S10
2
LDF
Position 1
X4
K4
BCD
OUT
CurrentPosition
V2001
LDF
Input 1
X0
K4
BCD
OUT
DesiredPosition
V2000
Turret Solenoid
Y5
RST
Ready Stage
S0
JMP
SG
FAULT_CHK STAGE
S12
4
Extend Fix Stage
S1
TMR
T7
K30
5
Retract Fixture
S4
TMR
T3
K100
Rotate
S3
6
T7
T3
Ready Stage
S0
S4
RST
ERROR RECOVER
S13
JMP
SG
ERROR RECOVER
S13
8
Fault
Y1
SET
CW Solenoid
Y2
RST
CCW Solenoid
Y3
RST
Slow Solenoid
Y4
RST
Shotpin
Y6
RST
Load in the current position (1 - 8.) Load in the desired position (1 - 8.) The home position is 000b so add 1 to adjust the number (1d = 000b and 8d = 111b.)
Also in the Ready Stage reset all of the solenoids.
SG
Ready Stage
S0

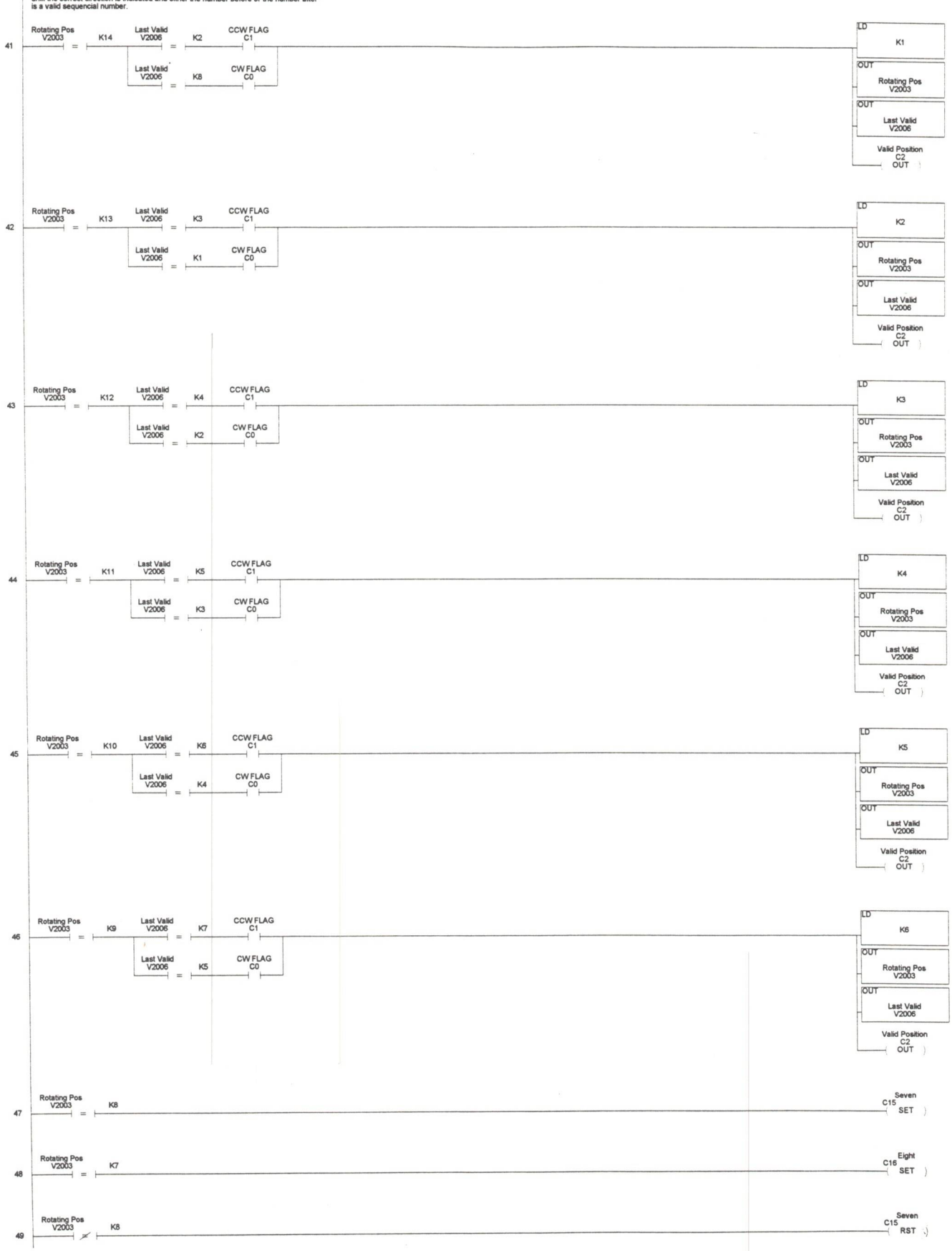
FIGURE 5

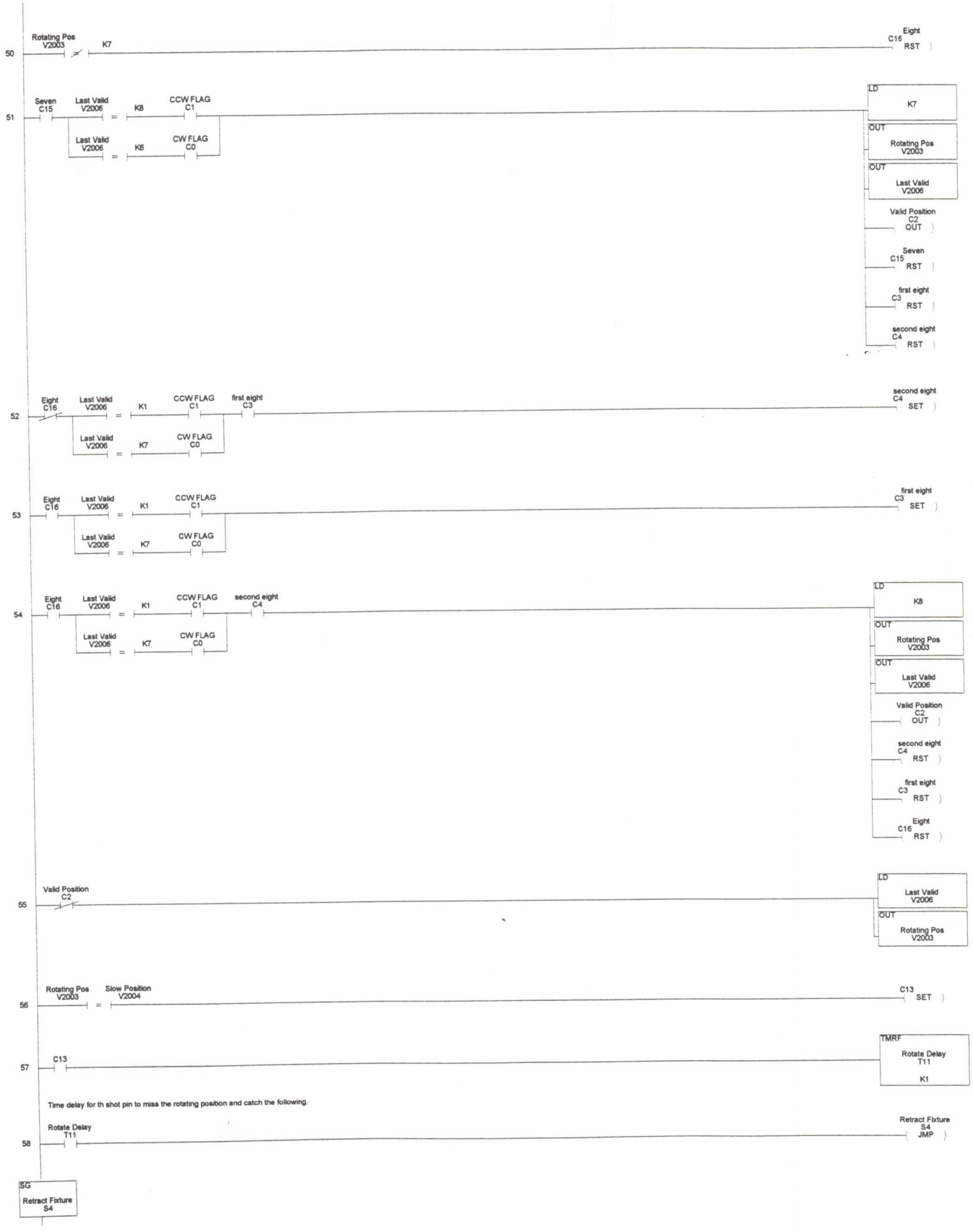

10
LDF
Position 1
X4
K4
BCD
OUT
CurrentPosition
V2001
LD
K1
OUT
one
V2005
LDF
Input 1
X0
K4
BCD
OUT
DesiredPosition
V2000
Turret Solenoid
Y5
RST
CW Solenoid
Y2
RST
CCW Solenoid
Y3
RST
Slow Solenoid
Y4
RST
Shotpin
Y6
RST
Working
Y7
RST
11
CurrentPosition
V2001
=
K14
LD
K1
OUT
CurrentPosition
V2001
12
CurrentPosition
V2001
=
K13
LD
K2
OUT
CurrentPosition
V2001
13
CurrentPosition
V2001
=
K12
LD
K3
OUT
CurrentPosition
V2001
14
CurrentPosition
V2001
=
K11
LD
K4
OUT
CurrentPosition
V2001
15
CurrentPosition
V2001
=
K10
LD
K5
OUT
CurrentPosition
V2001
16
CurrentPosition
V2001
=
K9
LD
K6
OUT
CurrentPosition
V2001
17
CurrentPosition
V2001
=
K8
Seven
C15
SET
Eight
C16
RST

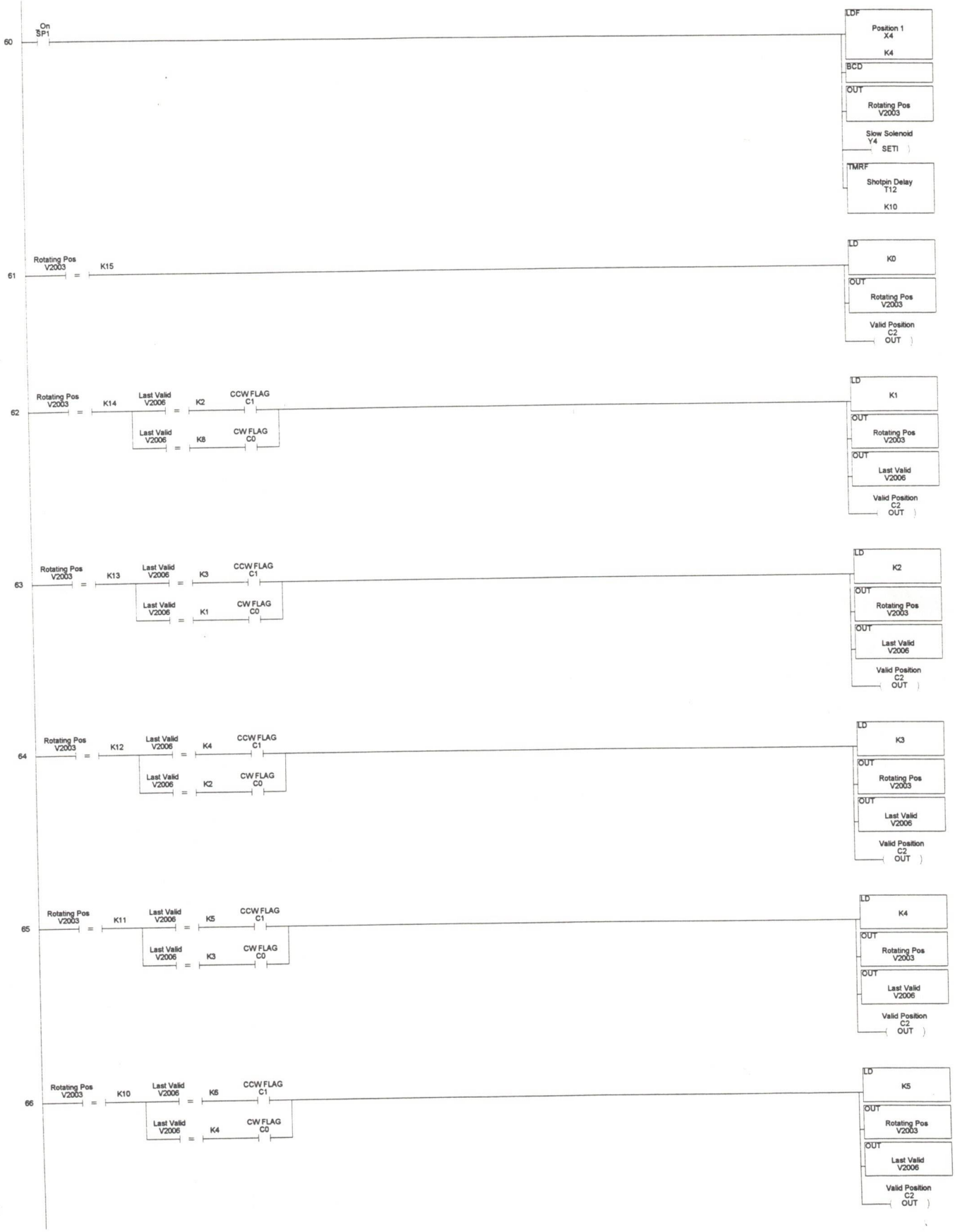

18
CurrentPosition V2001
=
K7
Eight C16 SET
Seven C15 RST
19
Seven C15
LD K7
OUT CurrentPosition V2001
Seven C15 RST
20
Eight C16
LD K8
OUT CurrentPosition V2001
Eight C16 RST
21
On SP1
LD CurrentPosition V2001
OUT Last Valid V2006
22
DesiredPosition V2000
=
CurrentPosition V2001
In Pos / Rdy Y0 SET
23
DesiredPosition V2000
K0
DesiredPosition V2000
<
K9
DesiredPosition V2000
CurrentPosition V2001
Go X11
Extend Fix Stage S1 JMP
SG
Extend Fix Stage S1
The delay gives time to allow the turret prox to break.
25
Turret Prox X10
Turret Solenoid Y5
Turret Solenoid Y5 SET
TMRF
Turret Ext Delay T0
K75
Working Y7 SET
In Pos / Rdy Y0 RST
26
Turret Ext Delay T0
Turret Prox X10
SetupMC S2 JMP
SG
SetupMC S2
28
LD DesiredPosition V2000
SUB CurrentPosition V2001
OUT Difference V2002
Shotpin Y6 SETI

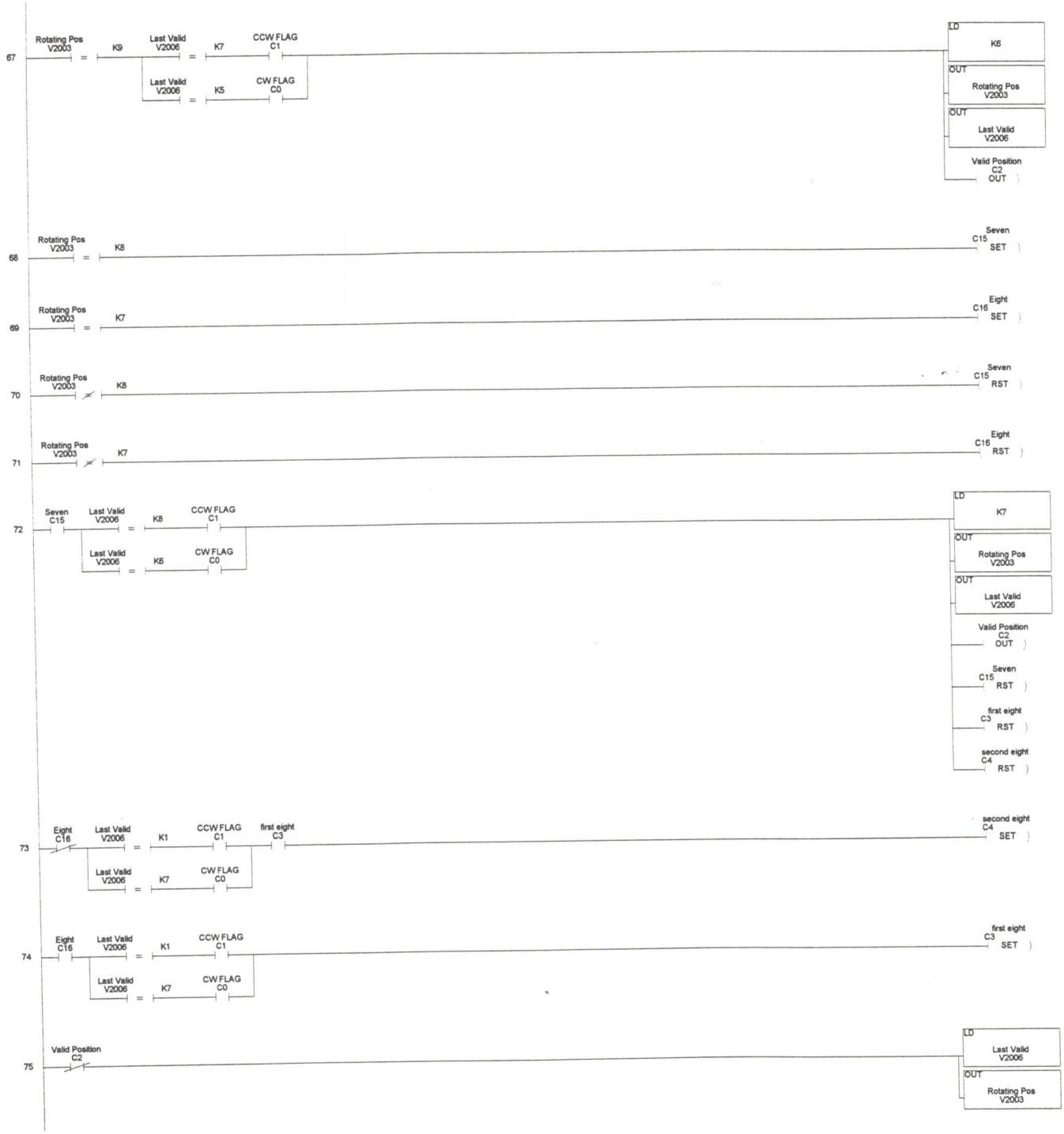

Determines the direction of the shortest distance to the desired position.
29
Difference V2002 >= K4
Difference V2002 < K8
Difference V2002 >= K9996
Difference V2002 < K9999
Difference V2002 = K9999
CCW FLAG C1 SET
CW FLAG C0 RST
30
Difference V2002 >= K0
Difference V2002 < K4
Difference V2002 < K9996
Difference V2002 >= K9993
CW FLAG C0 SET
CCW FLAG C1 RST
Load in the slow turret position.
31
CCW FLAG C1
LD DesiredPosition V2000
ADD one V2005
OUT Slow Position V2004
32
CW FLAG C0
LD DesiredPosition V2000
SUB one V2005
OUT Slow Position V2004
33
CW FLAG C0
DesiredPosition V2000 = K1
Slow Position V2004 = K0
LD K8
OUT Slow Position V2004
34
CCW FLAG C1
DesiredPosition V2000 = K8
Slow Position V2004 = K9
LD K1
OUT Slow Position V2004
35
NOP
36
On SP1
Slow Position V2004 < K9
Rotate S3 JMP
SG
Rotate S3
Starts the turret in motion.
38
CW FLAG C0
CW Solenoid Y2 SET
39
CCW FLAG C1
CCW Solenoid Y3 SET
Load in the rotating position.
40
On SP1
LDF Position 1 X4 K4
BCD
OUT Rotating Pos V2003

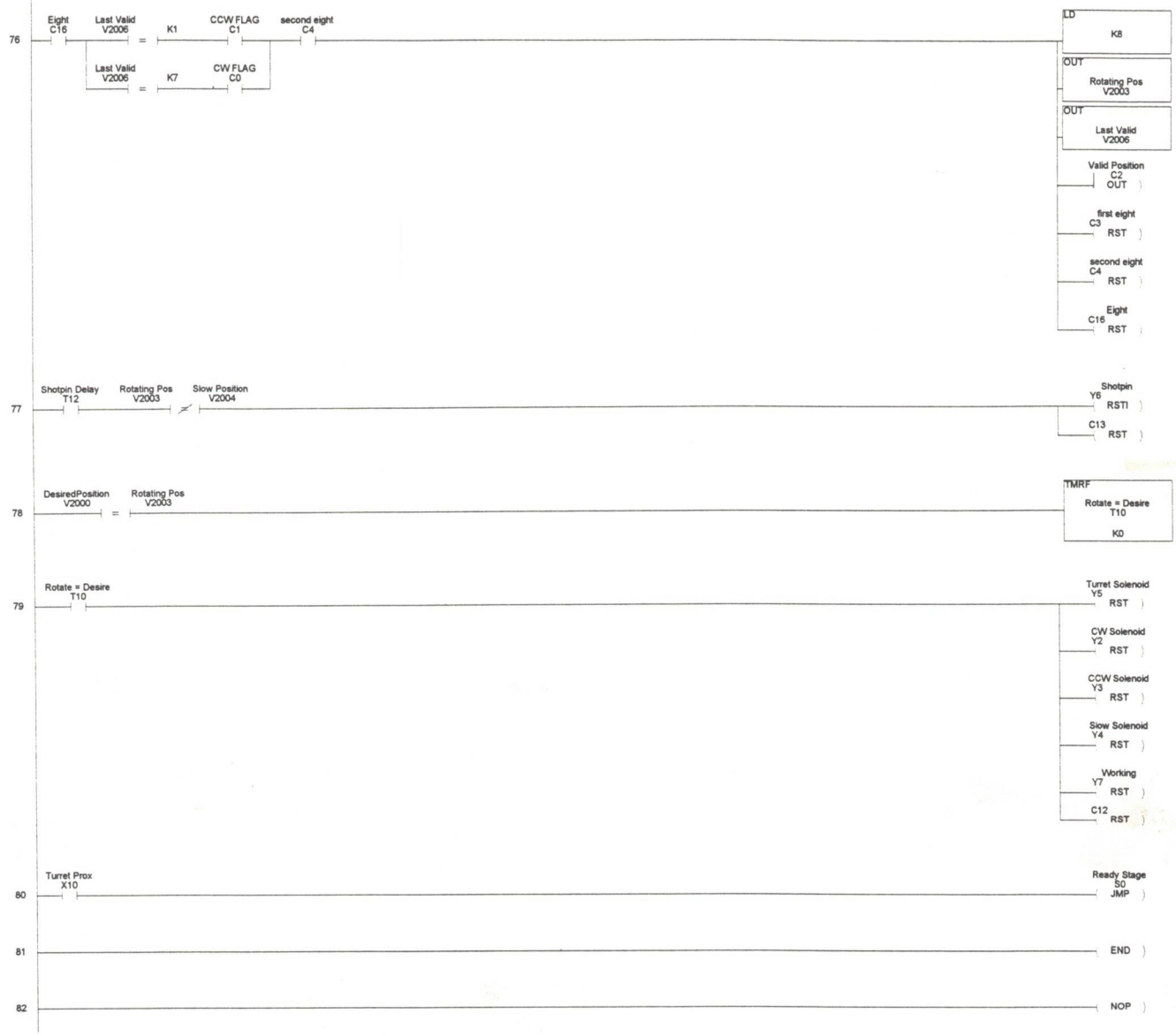
The following rungs load in a valid position. Each rotating position will not be valid until the correct direction is indicated and either the number before or the number after is a valid sequencial number.




50
Rotating Pos V2003
K7
Eight C16 RST
51
Seven C15
Last Valid V2006 = K8 CCW FLAG C1
Last Valid V2006 = K6 CW FLAG C0
LD K7
OUT Rotating Pos V2003
OUT Last Valid V2006
Valid Position C2 OUT
Seven C15 RST
first eight C3 RST
second eight C4 RST
52
Eight C16
Last Valid V2006 = K1 CCW FLAG C1 first eight C3
Last Valid V2006 = K7 CW FLAG C0
second eight C4 SET
53
Eight C16
Last Valid V2006 = K1 CCW FLAG C1
Last Valid V2006 = K7 CW FLAG C0
first eight C3 SET
54
Eight C16
Last Valid V2006 = K1 CCW FLAG C1 second eight C4
Last Valid V2006 = K7 CW FLAG C0
LD K8
OUT Rotating Pos V2003
OUT Last Valid V2006
Valid Position C2 OUT
second eight C4 RST
first eight C3 RST
Eight C16 RST
55
Valid Position C2
LD Last Valid V2006
OUT Rotating Pos V2003
56
Rotating Pos V2003 = Slow Position V2004
C13 SET
57
C13
TMRF Rotate Delay T11 K1
Time delay for th shot pin to miss the rotating position and catch the following.
58
Rotate Delay T11
Retract Fixture S4 JMP
SG Retract Fixture S4


60
On
SP1
LDF
Position 1
X4
K4
BCD
OUT
Rotating Pos
V2003
Slow Solenoid
Y4
SETI
TMRF
Shotpin Delay
T12
K10
61
Rotating Pos
V2003
=
K15
LD
K0
OUT
Rotating Pos
V2003
Valid Position
C2
OUT
62
Rotating Pos
V2003
=
K14
Last Valid
V2006
=
K2
CCW FLAG
C1
Last Valid
V2006
=
K8
CW FLAG
C0
LD
K1
OUT
Rotating Pos
V2003
OUT
Last Valid
V2006
Valid Position
C2
OUT
63
Rotating Pos
V2003
=
K13
Last Valid
V2006
=
K3
CCW FLAG
C1
Last Valid
V2006
=
K1
CW FLAG
C0
LD
K2
OUT
Rotating Pos
V2003
OUT
Last Valid
V2006
Valid Position
C2
OUT
64
Rotating Pos
V2003
=
K12
Last Valid
V2006
=
K4
CCW FLAG
C1
Last Valid
V2006
=
K2
CW FLAG
C0
LD
K3
OUT
Rotating Pos
V2003
OUT
Last Valid
V2006
Valid Position
C2
OUT
65
Rotating Pos
V2003
=
K11
Last Valid
V2006
=
K5
CCW FLAG
C1
Last Valid
V2006
=
K3
CW FLAG
C0
LD
K4
OUT
Rotating Pos
V2003
OUT
Last Valid
V2006
Valid Position
C2
OUT
66
Rotating Pos
V2003
=
K10
Last Valid
V2006
=
K6
CCW FLAG
C1
Last Valid
V2006
=
K4
CW FLAG
C0
LD
K5
OUT
Rotating Pos
V2003
OUT
Last Valid
V2006
Valid Position
C2
OUT


67
Rotating Pos V2003 = K9
Last Valid V2006 = K7
CCW FLAG C1
Last Valid V2006 = K5
CW FLAG C0
LD K6
OUT Rotating Pos V2003
OUT Last Valid V2006
Valid Position C2 OUT
68
Rotating Pos V2003 = K8
Seven C15 SET
69
Rotating Pos V2003 = K7
Eight C16 SET
70
Rotating Pos V2003 K8
Seven C15 RST
71
Rotating Pos V2003 K7
Eight C16 RST
72
Seven C15
Last Valid V2006 = K8
CCW FLAG C1
Last Valid V2006 = K6
CW FLAG C0
LD K7
OUT Rotating Pos V2003
OUT Last Valid V2006
Valid Position C2 OUT
Seven C15 RST
first eight C3 RST
second eight C4 RST
73
Eight C16
Last Valid V2006 = K1
CCW FLAG C1
first eight C3
Last Valid V2006 = K7
CW FLAG C0
second eight C4 SET
74
Eight C16
Last Valid V2006 = K1
CCW FLAG C1
Last Valid V2006 = K7
CW FLAG C0
first eight C3 SET
75
Valid Position C2
LD Last Valid V2006
OUT Rotating Pos V2003


76
Eight C16
Last Valid V2006 = K1
CCW FLAG C1
second eight C4
Last Valid V2006 = K7
CW FLAG C0
LD K8
OUT Rotating Pos V2003
OUT Last Valid V2006
Valid Position C2 OUT
first eight C3 RST
second eight C4 RST
Eight C16 RST
77
Shotpin Delay T12
Rotating Pos V2003
Slow Position V2004
Shotpin Y6 RSTI
C13 RST
78
DesiredPosition V2000 = Rotating Pos V2003
TMRF Rotate = Desire T10 K0
79
Rotate = Desire T10
Turret Solenoid Y5 RST
CW Solenoid Y2 RST
CCW Solenoid Y3 RST
Slow Solenoid Y4 RST
Working Y7 RST
C12 RST
80
Turret Prox X10
Ready Stage S0 JMP
81
END
82
NOP

SECTION IV

PNEUMATIC SYSTEM

A) PNEUMATIC ADJUSTMENTS

1) MOTOR FAST SPEED ADJUSTMENT

1A) EXTEND THE TURRET
1B) RETRACT THE SHOT PIN
1C) START THE MOTOR (CW or CCW)
1D) ADJUST FAST SPEED FLOW CONTROL MUFFLER AT MAIN VALVE TO ACHIEVE 18 TO 20 RPM OF THE TURRET DISC.
(see figure 6)

2) MOTOR SLOW SPEED ADJUSTMENT

FOLLOW THE PROCEDURE FOR THE FAST SPEED ADJUSTMENT BUT ENERGIZE THE SLOW SPEED BEFORE ADJUSTING THE SLOW SPEED FLOW CONTROL. SLOW SPEED SHOULD BE APPROXIMATELY 10 RPM.
(see figure 6)

NOTE: ACTUAL SLOW SPEED MAY VARY SLIGHTLY TO ACHIEVE SMOOTH ENGAGEMENT OF THE AIR-DEX TOOTHED COUPLING RINGS.

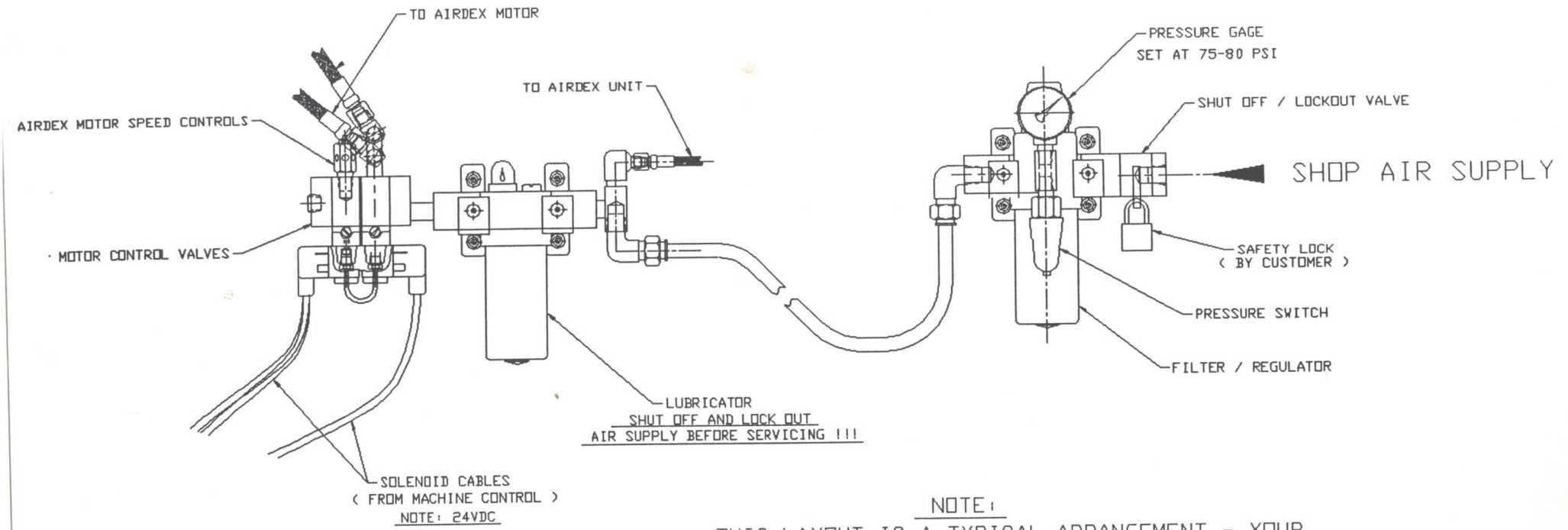
3) COUPLING RING PURGE AIR ADJUSTMENT

3A) EXTEND THE TURRET
3B) WITH TURRET EXTENDED, INSERT A 3/16" ALLEN WRENCH INTO THE PURGE AIR ADJUSTMENT SCREW, LOCATED IN THE CENTER OF THE SPINDLE, AT THE TURRET DISC END.
3C) TURN CLOCKWISE TO FULLY CLOSED POSITION AND THEN TURN SLOWLY COUNTER CLOCKWISE UNTIL A SLIGHT HISSING CAN BE HEARD AT THE INTERFACE BETWEEN THE TURRET DISC AND THE SPINDLE HOUSING NOSE. REMOVABLE THREAD LOCK SHOULD BE APPLIED TO THREADS OF PURGE SCREW.

NOTE: OPENING THE PURGE AIR SCREW TOO FAR MAY CAUSE AN EXCESSIVE PRESSURE DROP AT THE MAIN PISTON AND THE TOOTHED COUPLING RING WILL NOT FULLY DISENGAGE. THIS WILL PREVENT THE TURRET FROM ROTATING OR MAY CAUSE A KNOCKING SOUND DURING ROTATION. THIS IS A FACTORY SET ADJUSTMENT, AND SHOULD NOT REQUIRE FIELD ADJUSTMENT.

B) PNEUMATIC SCHEMATIC (see figure 7)

PNEUMATIC COMPONENT ARRANGEMENT



NOTE:

THIS LAYOUT IS A TYPICAL ARRANGEMENT - YOUR ACTUAL ARRANGEMENT MAY VARY SLIGHTLY.

FIGURE 6

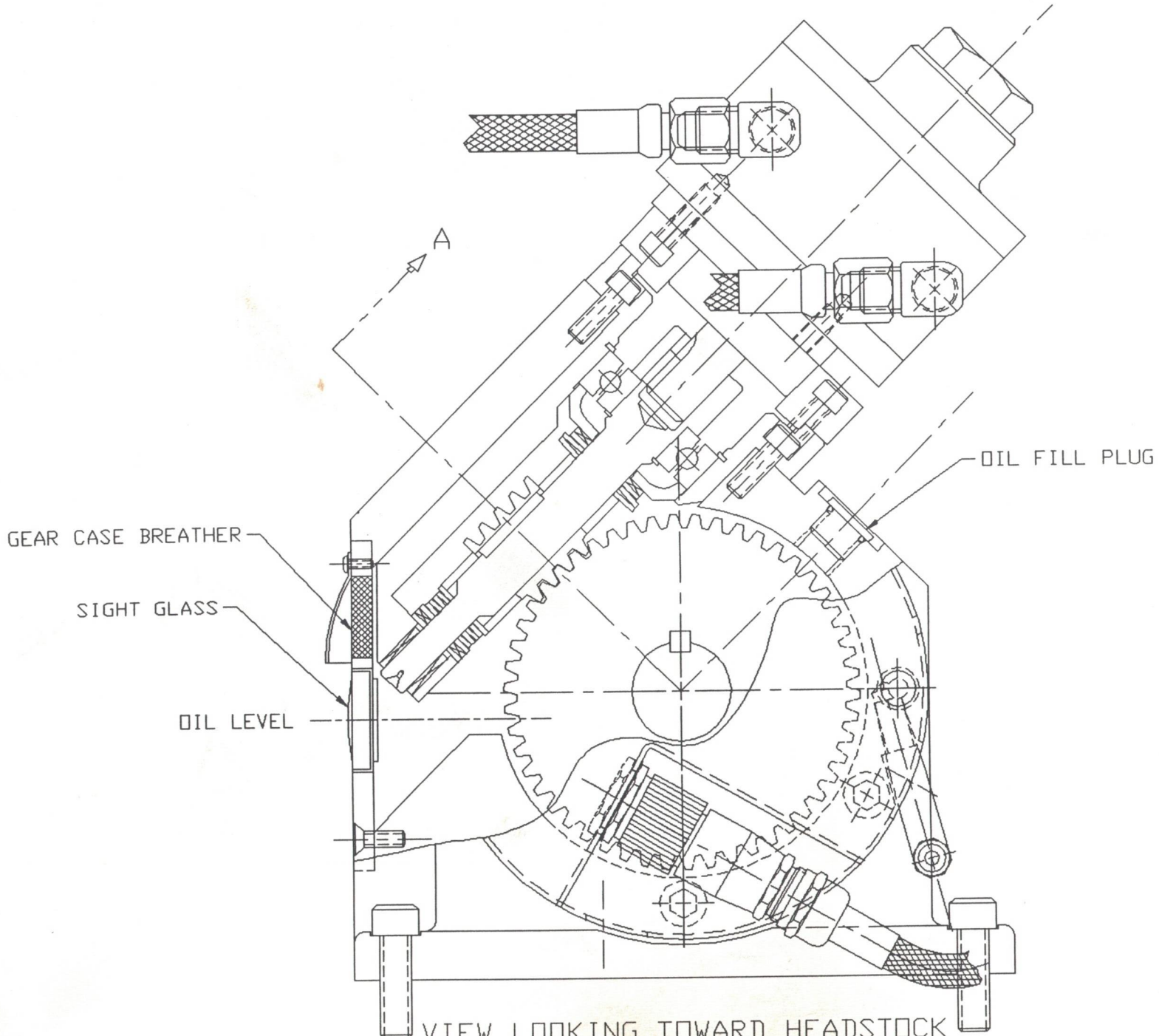
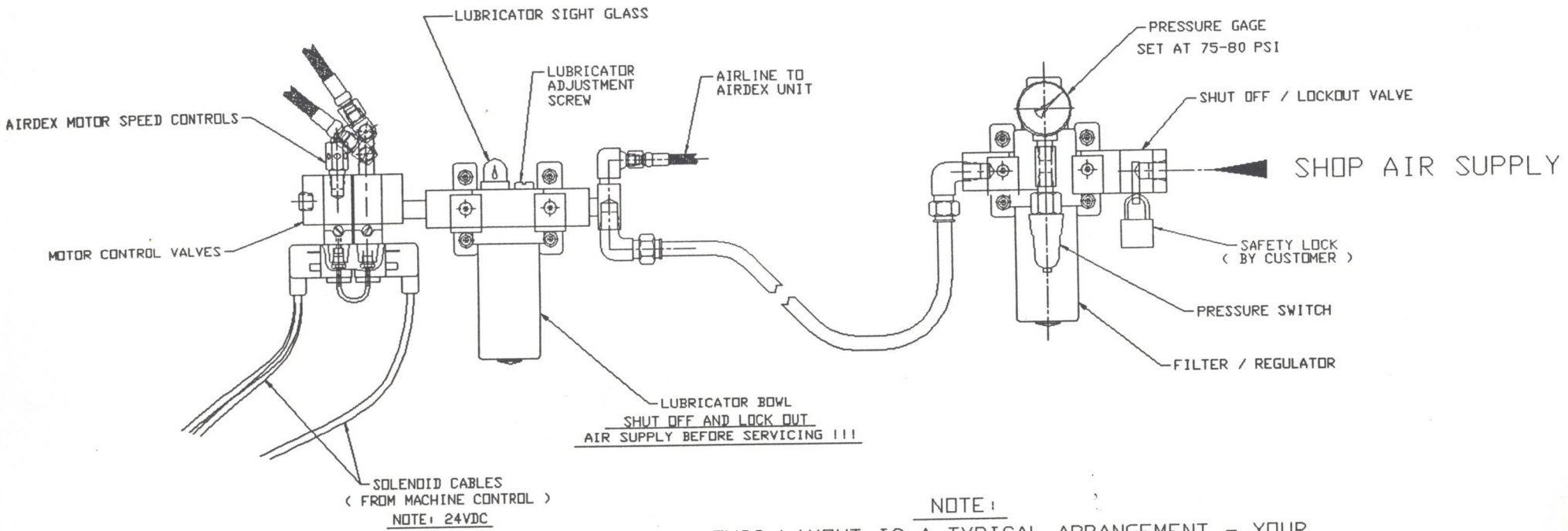

A
OIL FILL PLUG
GEAR CASE BREATHER
SIGHT GLASS
OIL LEVEL
VIEW LOOKING TOWARD HEADSTOCK

FIGURE 8

LUBRICATOR & PNEUMATIC COMPONENTS



NOTE:

THIS LAYOUT IS A TYPICAL ARRANGEMENT - YOUR ACTUAL ARRANGEMENT MAY VARY SLIGHTLY.

FIGURE 9

SECTION V

LUBRICATION

A) GEAR CASE LUBRICATION

VACTRA #2 OR EQUIVALENT SHOULD BE USED IN THE GEAR CASE.

A1) TO FILL OR ADD ADDITIONAL OIL TO THE GEAR CASE, YOU MUST REMOVE THE OIL FILL PLUG. THIS PIPE PLUG IS LOCATED BEHIND THE AIR MOTOR AT THE UPPER SECTION OF THE SPINDLE HOUSING. USE A 3/16" ALLEN WRENCH TO REMOVE THE PIPE PLUG. (see figure 8)

A2) USING A HAND PUMP OIL CAN, FILL THE HOUSING UNTIL THE SIGHT GLASS INDICATES HALF FULL. (see figure 8.) FILL SLOWLY, ALLOW AMPLE TIME BETWEEN PUMPS TO AVOID OVER FILLING. THE GEAR CASE WILL REQUIRE APPROXIMATELY 5 oz .

A3) REPLACE THE PIPE PLUG.

B) DRAINING THE GEAR CASE LUBRICANT

B1) REMOVE THE FOUR BOLTS FROM THE SIGHT GLASS MOUNTING PLATE.

B2) REMOVE THE PLATE

B3) TO REPLACE THE PLATE, FIRST CLEAN MATING SURFACES.

B4) APPLY A THIN LAYER OF SILICONE SEALANT (RTV) TO THE SPINDLE HOUSING.

B5) PLACE THE PLATE INTO POSITION AND BOLT SECURELY.

B6) FILL THE GEAR CASE AS DESCRIBED ABOVE.

C) AIR MOTOR LUBRICATION

ARO LUBRICATING OIL OR EQUIVALENT SHOULD BE USED IN THE AUTOMATIC IN-LINE-LUBRICATOR.

NOTE: PROPER LUBRICANT AND PROPER SETTING OF THE LUBRICATOR IS VERY IMPORTANT TO THE LIFE AND FUNCTION OF THE PNEUMATIC SYSTEM. NOT USING THE PROPER LUBRICANT AND PROPER LUBRICATOR SETTINGS COULD RESULT IN AN OUT OF WARRANTY FAILURE OF THE SYSTEM AND AN UNSCHEDULED DOWN-TIME OF THE EQUIPMENT. PLEASE READ AND FOLLOW CAREFULLY.

C1) TO FILL THE IN-LINE-LUBRICATOR YOU MUST FIRST TURN OFF THE AIR SUPPLY AND LOCK OUT THE SYSTEM. (see figure 9.)

C2) PURGE THE PNEUMATIC SYSTEM OF BACK PRESSURE.

C3) REMOVE THE POLYCARBONATE BOWL FROM THE LUBRICATOR BY APPLYING SLIGHT UPWARD FORCE TO THE BOWL AND ROTATE. (see figure 9.)

C4) FILL THE BOWL WITH PROPER LUBRICANT AND REPLACE THE BOWL. BE POSITIVE THE BOWL IS SECURE PRIOR TO TURNING ON THE AIR SUPPLY.

D) ADJUSTMENT OF THE IN-LINE-LUBRICATOR

D1) MOUNTED ON THE TOP OF THE LUBRICATOR IS A SIGHT GLASS THAT WILL ALLOW VISUAL INSPECTION OF THE OIL QUANTITY, BY COUNTING DROPLETS OF OIL INTRODUCED TO THE PNEUMATIC SYSTEM. (see figure 9.) LOCATED NEXT TO THE SIGHT GLASS IS A NEEDLE ADJUSTMENT SCREW. (see figure 9.)

D2) WITH THE AIR-DEX TURRET PERFORMING TOOL INDEXES, ADJUST THE NEEDLE VALVE SO THAT THE LUBRICATOR IS SET FOR (1) ONE DROP OF OIL FOR EVERY (1) TEN INDEXES OF THE AIR-DEX TURRET. TURNING THE NEEDLE CLOCKWISE TO DECREASE AND COUNTER CLOCKWISE TO INCREASE.

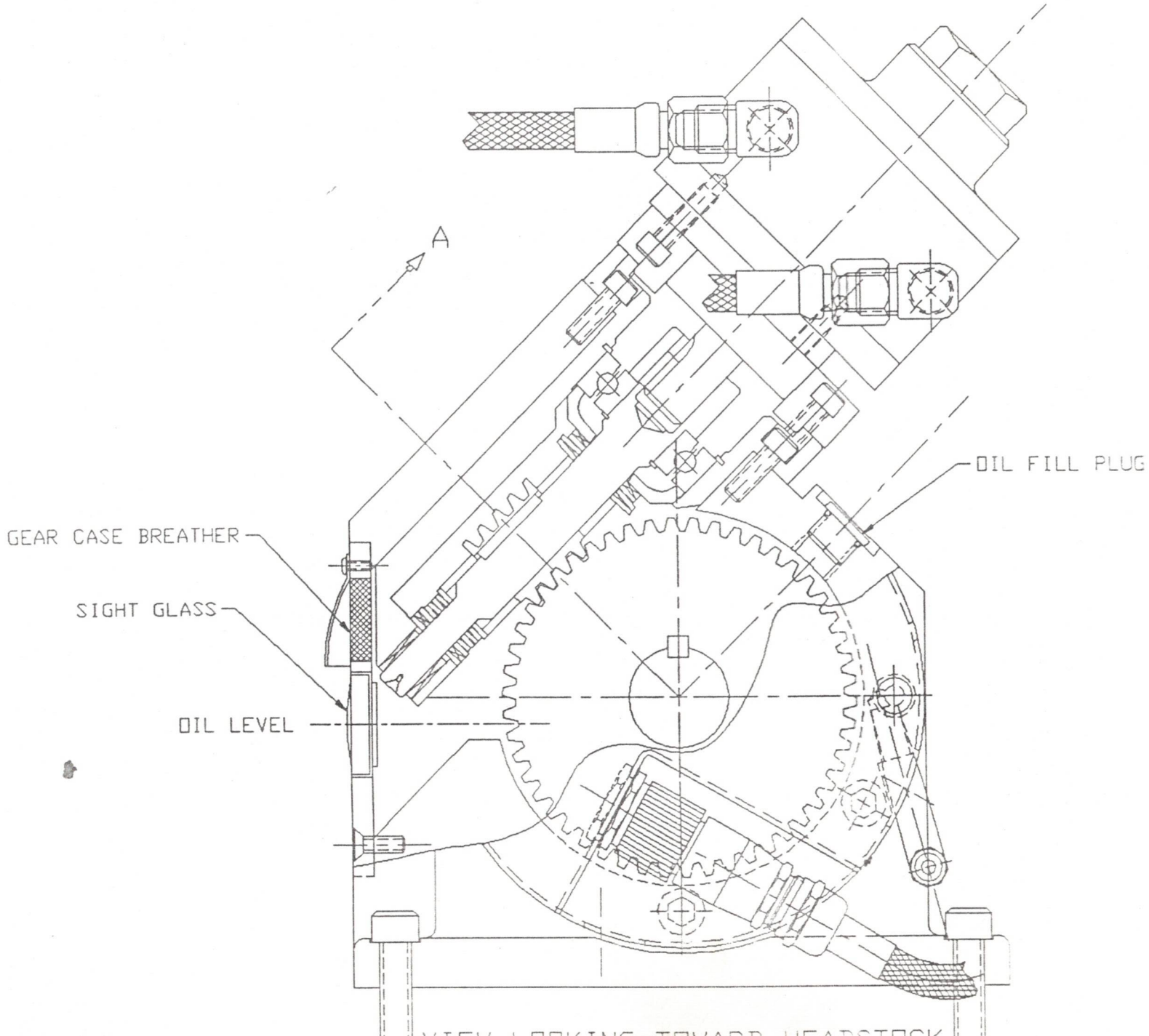
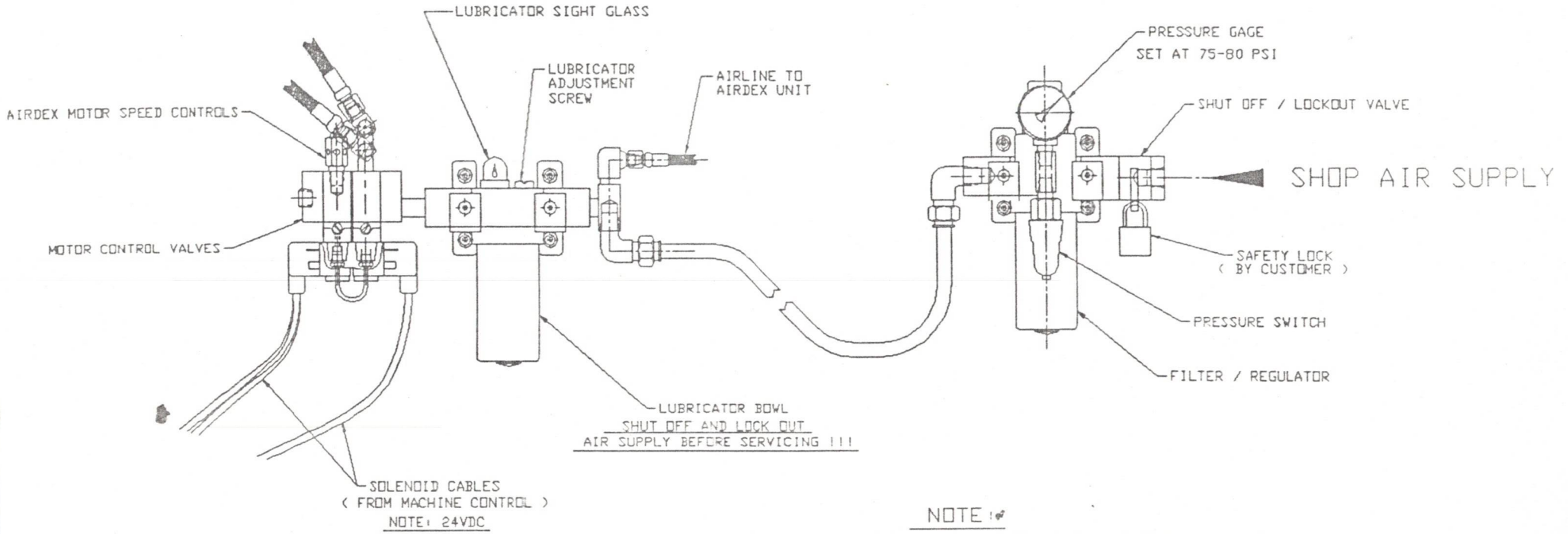

A
OIL FILL PLUG
GEAR CASE BREATHER
SIGHT GLASS
OIL LEVEL
VIEW LOOKING TOWARD HEADSTOCK

FIGURE 8

LUBRICATOR & PNEUMATIC COMPONENTS



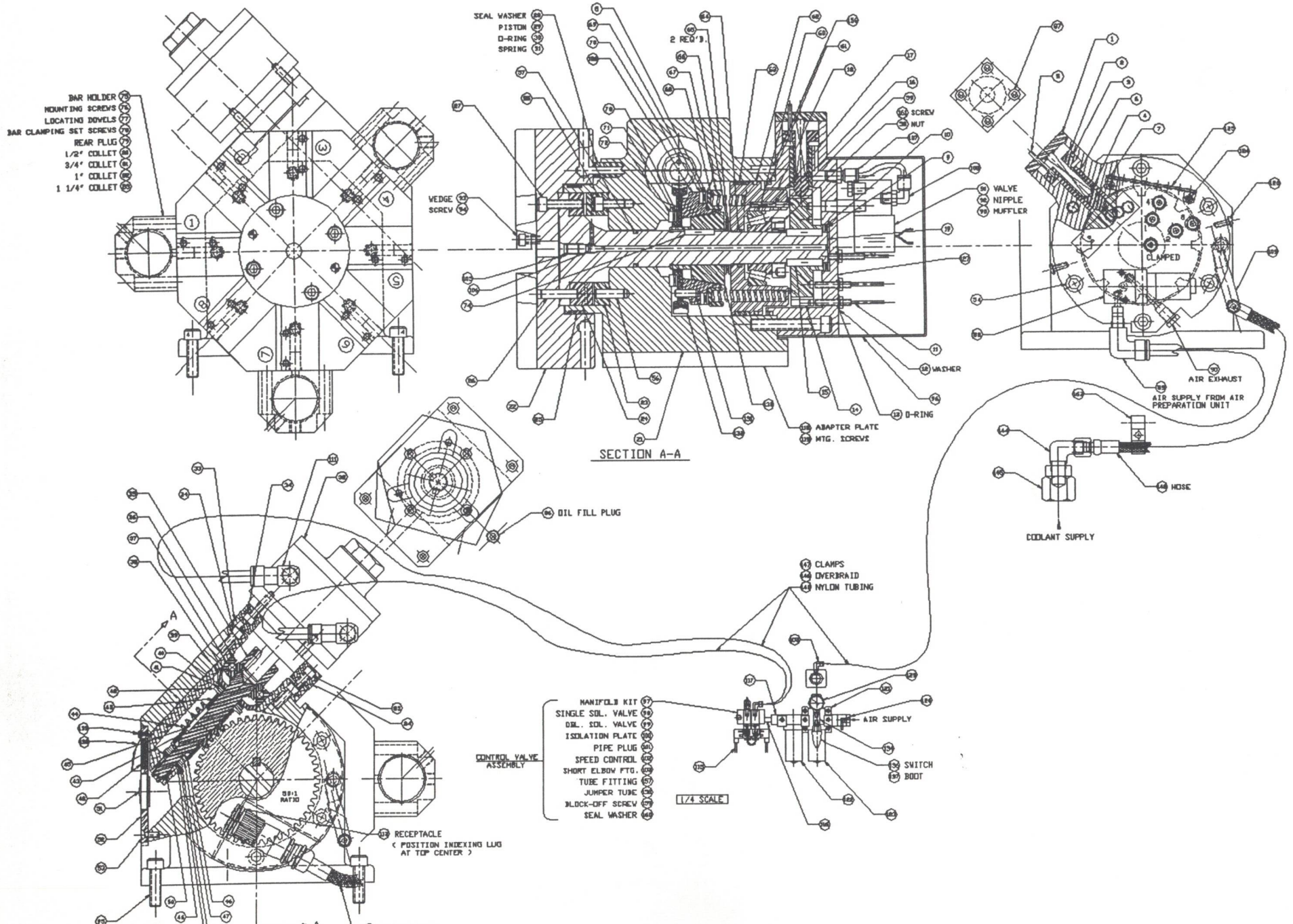
NOTE:

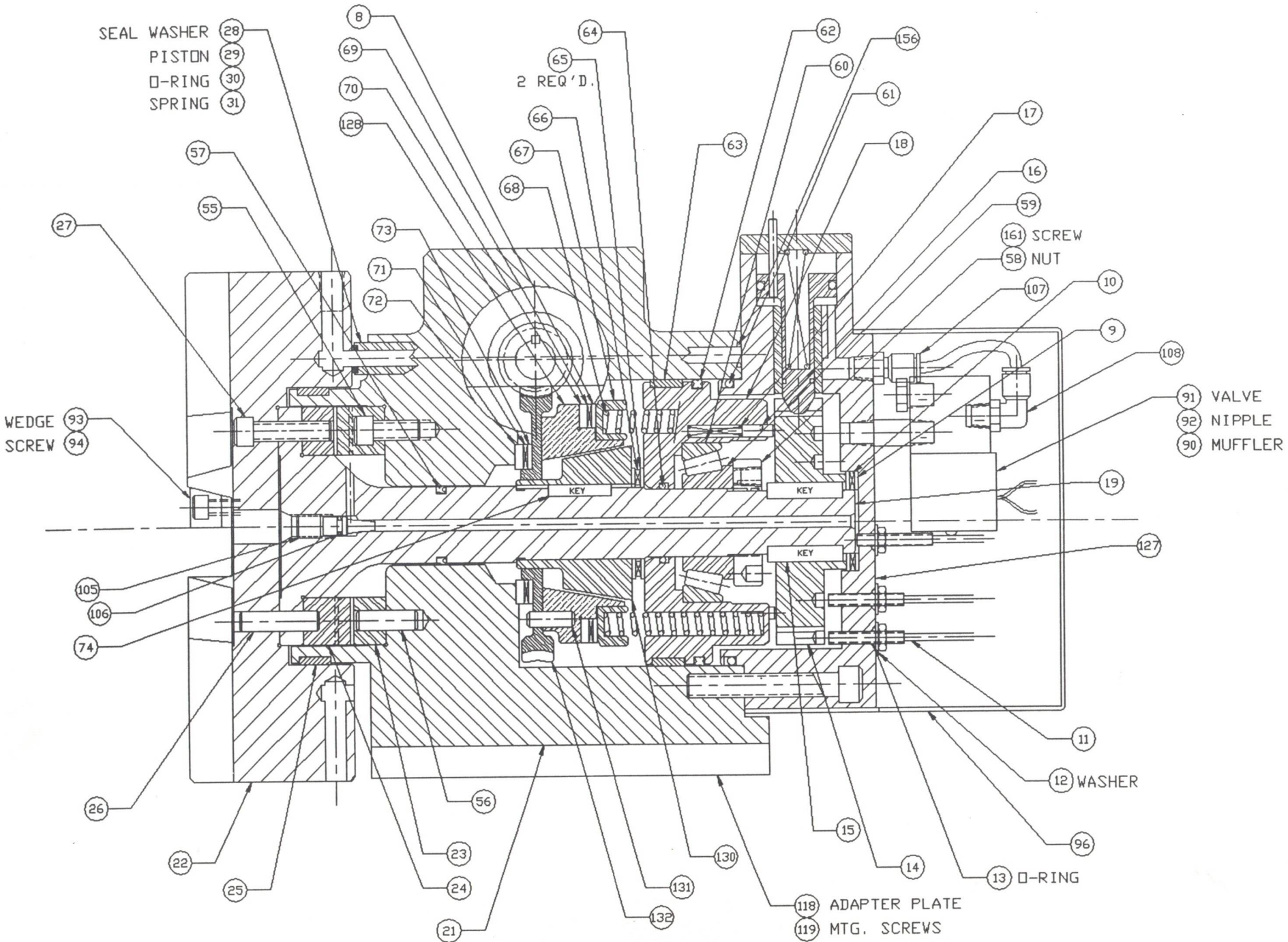
THIS LAYOUT IS A TYPICAL ARRANGEMENT - YOUR ACTUAL ARRANGEMENT MAY VARY SLIGHTLY.

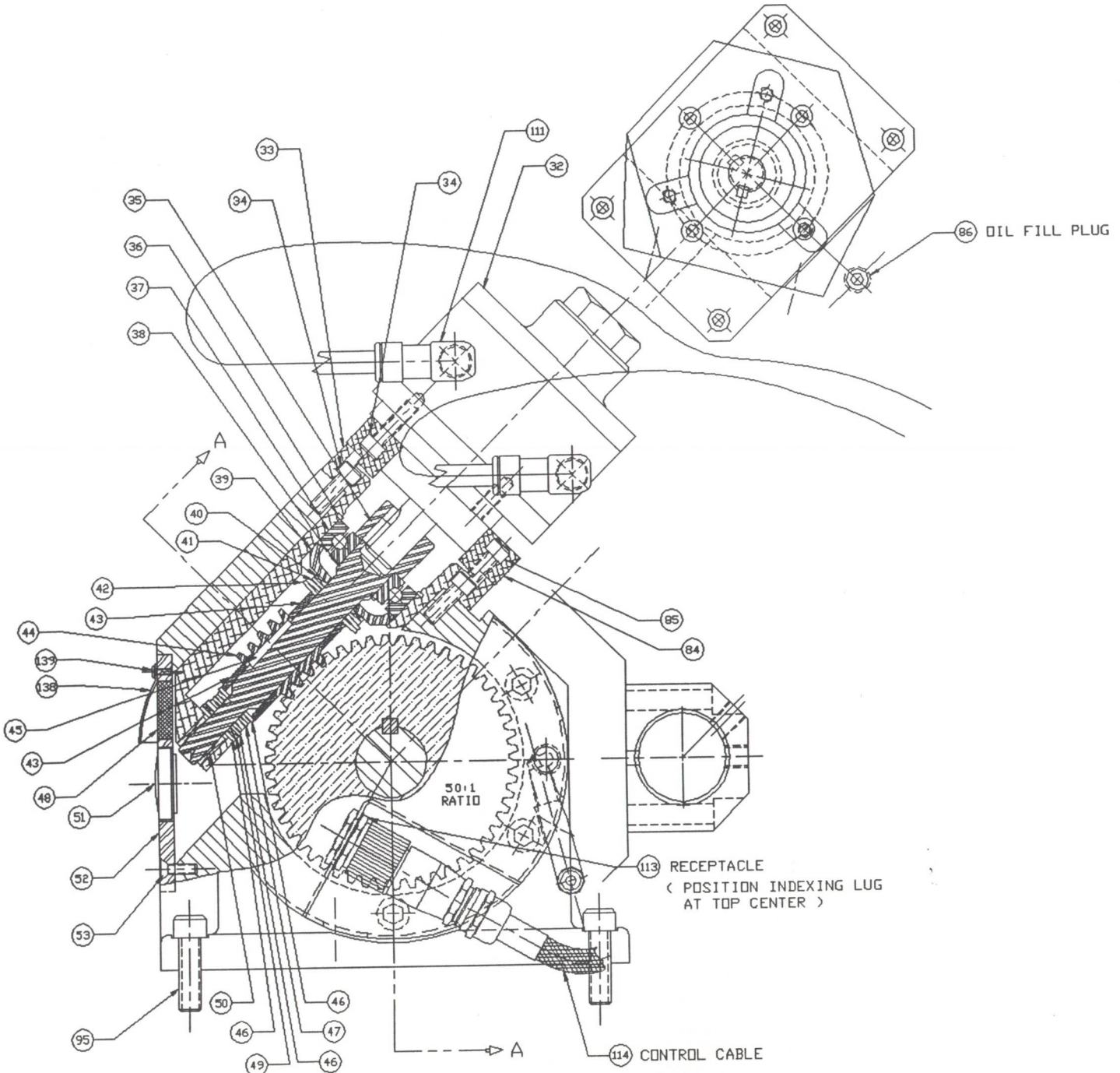
FIGURE 9

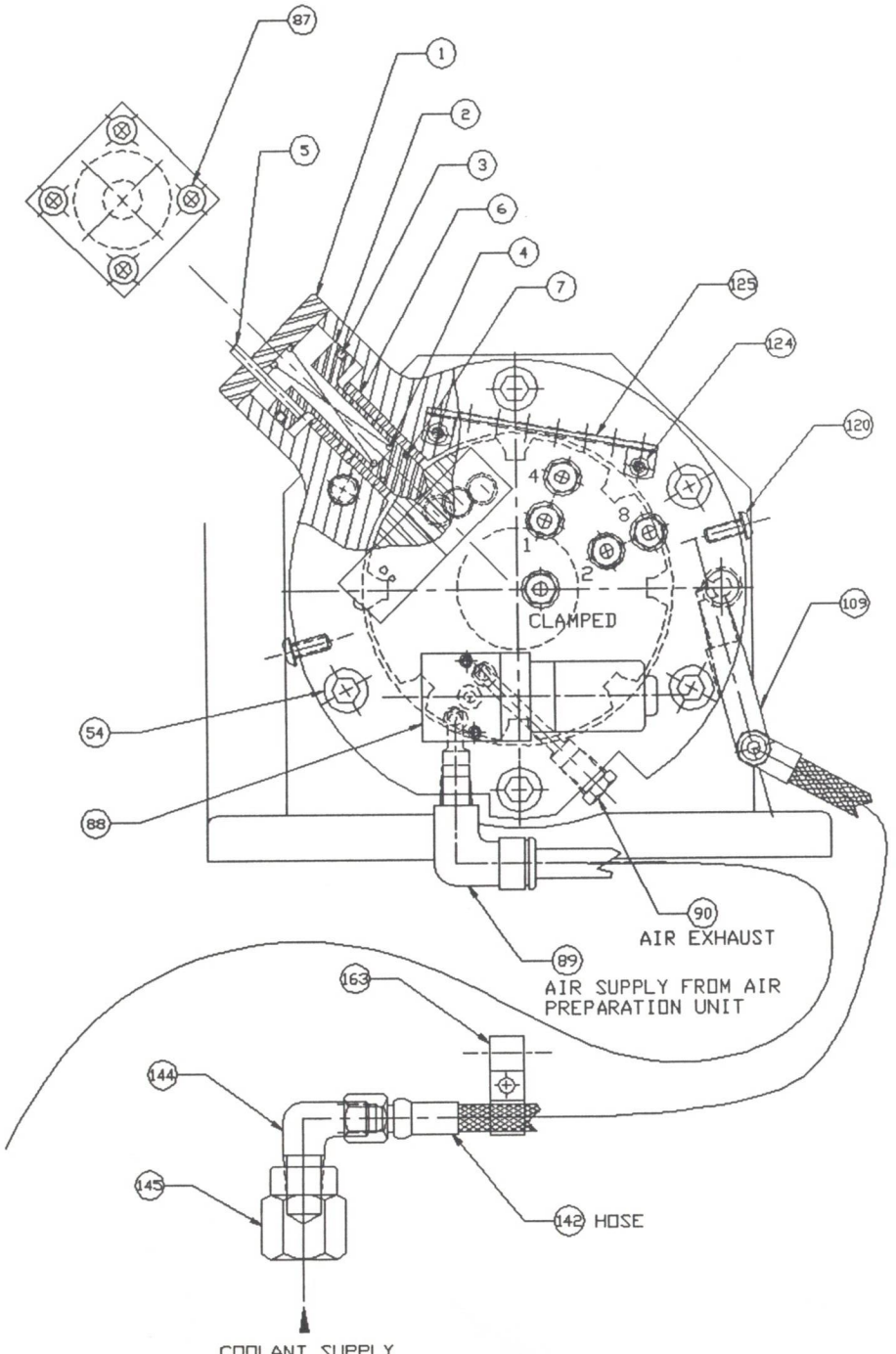
SECTION VI

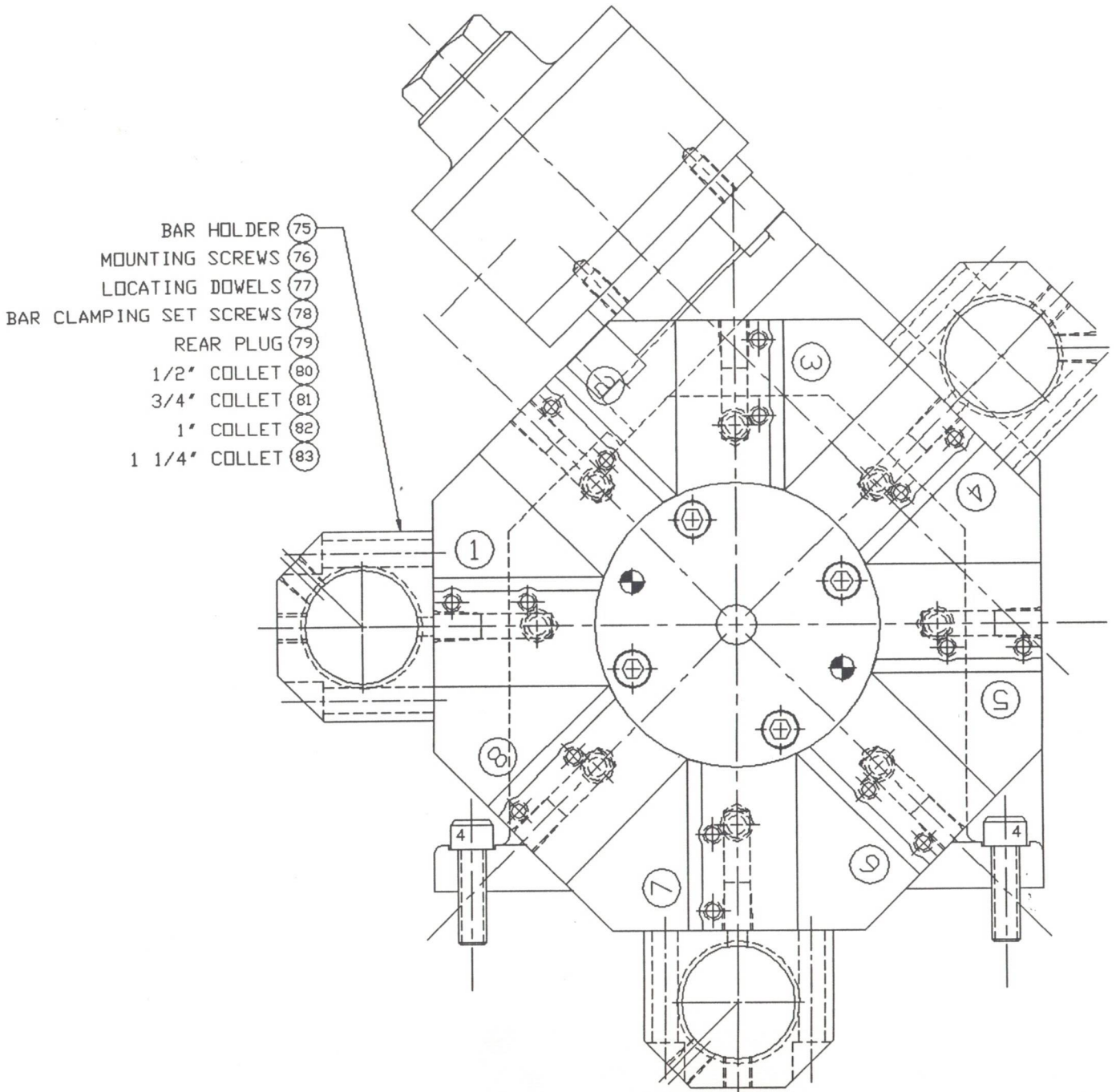
ASSEMBLY DIAGRAMS AND PARTS LIST

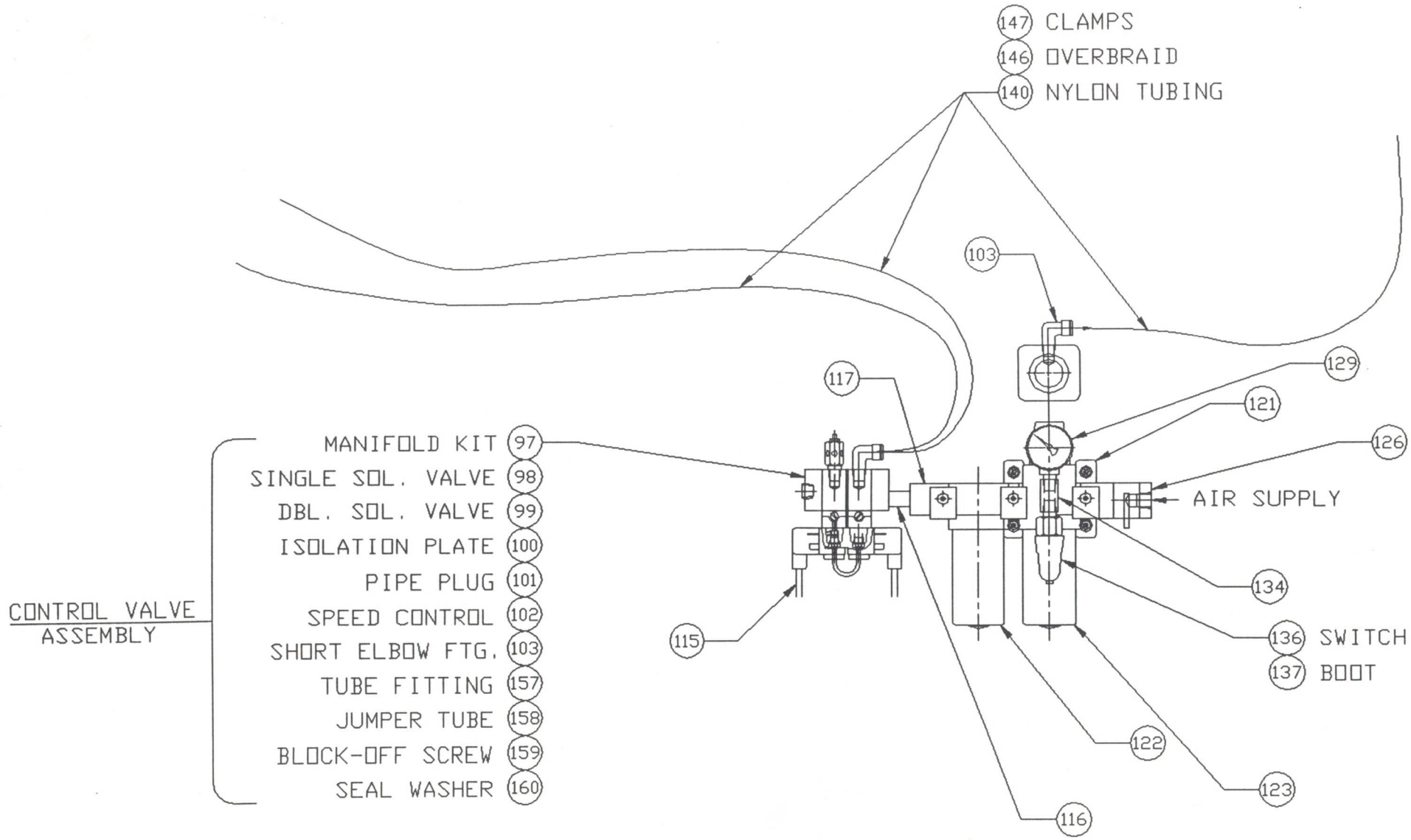

BAR HOLDER
MOUNTING SCREWS
LOCATING DOWELS
BAR CLAMPING SET SCREWS
REAR PLUG
1/2" COLLET
3/4" COLLET
1" COLLET
1 1/4" COLLET
SEAL WASHER
PISTON
O-RING
SPRING
2 REQ'D.
SCREW
NUT
WASHER
O-RING
ADAPTER PLATE
MTG. SCREWS
VEDGE
SCREW
VALVE
NIPPLE
MUFFLER
CLAMPED
AIR EXHAUST
AIR SUPPLY FROM AIR PREPARATION UNIT
HOSE
COOLANT SUPPLY
SECTION A-A
OIL FILL PLUG
CLAMPS
OVERBRAID
NYLON TUBING
AIR SUPPLY
SWITCH
BOOT
CONTROL VALVE ASSEMBLY
MANIFOLD KIT
SINGLE SOL. VALVE
DBL. SOL. VALVE
ISOLATION PLATE
PIPE PLUG
SPEED CONTROL
SHORT ELBOW FTG.
TUBE FITTING
JUMPER TUBE
BLOCK-OFF SCREW
SEAL WASHER
1/4 SCALE
50:1 RATIO
RECEPTACLE
(POSITION INDEXING LUG AT TOP CENTER)


SEAL WASHER 28
PISTON 29
O-RING 30
SPRING 31
8
69
70
128
64
65
2 REQ'D.
62
156
60
61
66
67
68
63
18
17
16
59
57
55
27
73
71
72
161 SCREW
58 NUT
107
10
9
108
91 VALVE
92 NIPPLE
90 MUFFLER
WEDGE 93
SCREW 94
KEY
KEY
KEY
19
127
105
106
74
26
22
25
56
23
24
21
130
131
132
15
14
13 O-RING
96
12 WASHER
11
118 ADAPTER PLATE
119 MTG. SCREWS


111
33
32
34
35
34
36
37
38
86 OIL FILL PLUG
A
39
40
41
42
43
44
139
138
45
43
48
51
52
53
50
46
95
46
47
49
46
85
84
30:1
RATIO
113 RECEPTACLE
(POSITION INDEXING LUG
AT TOP CENTER)
A
114 CONTROL CABLE


87
1
2
3
6
4
7
125
124
120
5
4
8
1
2
9
CLAMPED
109
54
88
90
AIR EXHAUST
89
AIR SUPPLY FROM AIR
PREPARATION UNIT
163
144
145
142
HOSE
COOLANT SUPPLY


BAR HOLDER 75
MOUNTING SCREWS 76
LOCATING DOWELS 77
BAR CLAMPING SET SCREWS 78
REAR PLUG 79
1/2" COLLET 80
3/4" COLLET 81
1" COLLET 82
1 1/4" COLLET 83
1
2
3
4
5
6
7
8
4
4


147 CLAMPS
146 OVERBRAID
140 NYLON TUBING
103
117
129
121
126
AIR SUPPLY
134
136 SWITCH
137 BOOT
115
122
123
116
CONTROL VALVE ASSEMBLY
MANIFOLD KIT 97
SINGLE SOL. VALVE 98
DBL. SOL. VALVE 99
ISOLATION PLATE 100
PIPE PLUG 101
SPEED CONTROL 102
SHORT ELBOW FTG. 103
TUBE FITTING 157
JUMPER TUBE 158
BLOCK-OFF SCREW 159
SEAL WASHER 160

DET	QTY	MATERIAL	STOCK SIZE	DESCRIPTION
163	3	S&S	H-159	TUBE CLAMP
162				
161	2	S&S	H-202	PIPE PLUG
160	1	S&S	H-196	SEALING WASHER
159	1	S&S	H-195	SHCS
158	1	BTK.	3/32 O.D. X 3.0	URETHANE TUBING
157	2	S&S	8-183	TUBE FITTING
156	1	S&S	RS8-121	O-RING
155				
154				
153				
152				
151				
150				
149				
148				
147	6	S&S	SAS-176	CLAMP
146	3	S&S	SAS-179 X 10.5 FT.	S.S. OVERBRAID
145	1	S&S	H-166	REDUCER FITTING
144	1	S&S	8-175	TUBE ELBOW
143				
142	1	S&S	8-226	HOSE ASSY. (COOLANT)
141				
140	3	S&S	SAS-179 X 12.5 FT.	HOSE ASSY.
139	3	S&S	H-182	BHCS

DET	QTY	MATERIAL	STOCK SIZE	DESCRIPTION
138	1	S&S	AMS-167	CLAMSHELL VENT
137	1	S&S	AMS-192	SWITCH BODY
136	1	S&S	AMS-191	PRESSURE SWITCH
135				
134	1	S&S	AMS-189	TEE FITTING
133				
132	1	S&S	AMS-157	WORM GEAR
131	3	S&S	H-175	DOWEL
130	1	S&S	AMS-156	MALE CLUTCH CONE
129	1	S&S	AMS-175	PRESSURE GAGE
128	1	S&S	AMS-155	FEMALE CLUTCH HUB
127	1	S&S	AMS-161	END CAP
126	1	S&S	AMS-172	LOCK OUT VALVE
125	1	S&S	AMS-145	TERMINAL STRIP
124	2	S&S	H-170	BHCS
123	1	S&S	AMS-173	FILTER / REGULATOR
122	1	S&S	AMS-174	AIR LINE LUBRICATOR
121	2	S&S	AMS-171	MOUNTING BRACKET
120	2	S&S	H-119	BHCS
119	4	S&S	SEE ADAPTER PACKAGE	ADAPTER PLATE MTG. SCREWS
118	1	S&S	SEE ADAPTER PACKAGE	ADAPTER PLATE
117	1	S&S	AMS-187	PIPE ADAPTER
116	1	S&S	AMS-154	PIPE NIPPLE
115	3	S&S	AMS-150	SOLENOID CONNECTING CABLE
114	1	S&S	AMS-166	CONTROL CABLE ASSEMBLY
113	1	S&S	AMS-148	RECEPTACLE
112				
111	2	S&S	SAS-179	TUBE FITTING
110				
109	1	S&S	SAS-115	TUBE FITTING
108	1	S&S	8-167	TUBE FITTING
107	1	S&S	AMS-141	TUBE FITTING
106	1	S&S	SAS-147	O-RING
105	1	S&S	SAS-144	PURGE METERING SCREW
104				
103	3	S&S	AMS-197	TUBE FITTING
102	2	S&S	AMS-137	SPEED CONTROL MUFFLER
101	3	S&S	AMS-136	PIPE PLUG (3/8 NPT)
100	1	S&S	AMS-135	ISOLATION PLATE
99	1	S&S	AMS-132	DOUBLE SOLENOID VALVE
98	1	S&S	AMS-133	SINGLE SOLENOID VALVE
97	1	S&S	AMS-134	MANIFOLD KIT
96	1	S&S	AMS-160	GUARD
95	4	S&S	H-160	SHCS
94	16	S&S	H-112	SHCS
93	8	S&S	SEE ADAPTER PACKAGE	TOOL WEDGE
92	1	S&S	RT-157	PIPE NIPPLE
91	1	S&S	RT-153	VALVE
90	2	S&S	8-165	BREATHER VENT
89	1	S&S	AMS-139	TUBE FITTING
88	1	S&S	RS8-136	VALVE
87	4	S&S	H-184	BHCS
86	1	S&S	8-184	PIPE PLUG
85	4	S&S	H-185	SHCS
84	1	S&S	AMS-125	MOTOR ADAPTER PLATE
83	1	S&S	8-133	1.25" BUSHING
82	1	S&S	8-152	1.00" BUSHING
81	1	S&S	8-151	.750" BUSHING
80	1	S&S	8-150	.500" BUSHING
79	3	S&S	8-142	REAR PLUG
78	6	S&S	H-116	HALF DOG SOC. SET SCREW
77	6	S&S	H-141	DOWEL
76	12	S&S	H-114	SHCS
75	3	S&S	8-118	BAR HOLDER
74	1	S&S	AMS-124	KEY
73	1	S&S	RS8-123	THRUST WASHER
72	1	S&S	RS8-124	THRUST WASHER
71	1	S&S	RS8-122	THRUST ROLLER ASSEMBLY
70	1	S&S	12-132	THRUST WASHER
69	1	S&S	12-131	THRUST ROLLER ASSEMBLY
68	18	S&S	AMS-196	SPRING
67	1	S&S	AMS-138	POCKETED THRUST WASHER
66	1	S&S	AMS-121	THRUST ROLLER ASSEMBLY
65	2	S&S	AMS-120	THRUST WASHER

DET	QTY	MATERIAL	STOCK SIZE	DESCRIPTION
64	1	S&S	RS8-125	O-RING
63	1	S&S	8-110	WEAR RING
62	1	S&S	S8-115	QUAD RING
61	1	S&S	8-129	O-RING
60	1	S&S	S8-114	BEARING CUP
59	1	S&S	S8-113	BEARING CONE
58	1	S&S	AMS-176	SPINDLE NUT
57	1	S&S	AMS-181	U-CUP SEAL
56	2	S&S	H-104	SPIRAL GROOVED PULL DOWEL
55	4	S&S	H-103	SHCS
54	6	S&S	H-193	SHCS
53	4	S&S	H-152	FHCS
52	1	S&S	RS8-115	COVER PLATE
51	1	S&S	RS8-133	SIGHT GLASS
50	1	S&S	RS8-132	NEEDLE BEARING
49	1	S&S	RS8-131	THRUST ROLLER ASSEMBLY
48	1	S&S	RS8-130	BREATHER DISC
47	4	S&S	RS8-129	BELLEVILLE WASHER
46	3	S&S	RS8-128	THRUST WASHER
45	1	S&S	RS8-112	WORM KEY
44	1	S&S	RS8-127	WORM
43	2	S&S	RS8-114	WORM SPACER
42	2	S&S	S8-109	BELLEVILLE WASHER
41	1	S&S	S8-142	THRUST WASHER
40	1	S&S	S8-143	THRUST ROLLER ASSEMBLY
39	1	S&S	RS8-111	UPPER WORM SPACER
38	1	S&S	S8-128	RETAINING RING
37	1	S&S	S8-125	BALL BEARING
36	1	S&S	S8-126	RETAINING RING
35	1	S&S	AMS-119	WORM SHAFT
34	7	S&S	H-172	SHCS
33	1	S&S	AMS-118	WORM HOUSING
32	1	S&S	AMS-117	AIR MOTOR
31	1	S&S	8-133	SPRING
30	2	S&S	8-132	O-RING
29	1	S&S	8-116	PISTON
28	1	S&S	8-131	SEAL WASHER
27	4	S&S	H-102	SHCS
26	2	S&S	H-105	DOWEL
25	1	S&S	8-104	WEAR RING
24	1	S&S	8-103A	MALE COUPLING
23	1	S&S	8-105A	FEMALE COUPLING
22	1	S&S	SEE ADAPTER PACKAGE	TURRET
21	1	S&S	RS8-101	SPINDLE HOUSING
20				
19	1	S&S	AMS-177	SPINDLE
18	1	S&S	AMS-178	PISTON
17	3	S&S	AMS-113	SPRING
16	3	S&S	AMS-112	PLUNGER
15	2	S&S	AMS-111	KEY
14	1	S&S	AMS-110	CODE / INDEX PLATE
13	5	S&S	S8-110	O-RING
12	5	S&S	AMS-109	FLAT WASHER
11	5	S&S	S8-119	PROXIMITY SENSOR
10	1	S&S	AMS-107	NEEDLE THRUST BEARING
9	2	S&S	AMS-106	THRUST WASHER
8	1	S&S	AMS-162	THRUST WASHER
7	1	S&S	8-132	O-RING
6	1	S&S	AMS-105	LINER BUSHING
5	1	S&S	H-173	DOWEL
4	1	S&S	AMS-104	SPRING
3	1	S&S	AMS-103	O-RING
2	1	S&S	AMS-102	SHOT PIN
1	1	S&S	AMS-101	SHOT PIN CAP

DET	QTY	MATERIAL	STOCK SIZE	DESCRIPTION

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES.
TOLERANCES ON :

1 PL. DECIMALS = ±.030
2 PL. DECIMALS = ±.015
3 PL. DECIMALS = ±.005
FRACTIONS = 1/16
ANGLES = ±1°

MARK TOOL NO. ON ALL PARTS

S & S Tool and Machine Company
910 N. English Station Rd.
Louisville, Ky. 40223
502/245-3481
Gages • Fixtures • Precision Machining

TITLE: AIR MOTOR SERVO AIRDEX

D. CLARK | 7-23-98 | FULL | AMS-8.DWG | AMS-8

SECTION VII

TROUBLE SHOOTING GUIDE

SYMPTOM	CORRECTIVE ACTION
1) TURRET WILL NOT EXTEND	1A) VERIFY 75 –85 PSI ON INCOMING AIR SUPPLY REGULATOR.
	1B) VERIFY 24 VDC SIGNAL AT CONTROL CABLE "PIN C" TO SOLENOID VALVE.
	1C) VERIFY TURRET EXTEND SOLENOID VALVE IS FUNCTIONAL.
	1D) IF PARTIALLY EXTENDED, CHECK THE COUPLING RING PURGE AIR ADJUSTMENT SCREW (see section 4 – A3)
2) SHOT PIN WILL NOT RETRACT	2A) VERIFY TURRET IS EXTENDED. SHOT PIN WILL NOT RETRACT UNLESS TURRET IS EXTENDED.
	2B) VERIFY 24 VDC SIGNAL AT CONTROL CABLE "PIN D" TO SOLENOID VALVE.
	2C) VERIFY SHOT PIN RETRACT SOLENOID VALVE IS FUNCTIONAL.
3) TURRET WILL NOT ROTATE	3A) VERIFY TURRET IS FULLY EXTENDED.
	3B) VERIFY SHOT PIN IS RETRACTED.
	3C) VERIFY 24 VDC SIGNAL AT SOLENOID VALVE FOR CW OR CCW ROTATION. (check LED lights on cables)

Continued from previous page.

3) TURRET WILL NOT ROTATE

3D) VERIFY VALVE HAS SHIFTED AND IS SUPPLYING AIR TO THE MOTOR.

3E) VERIFY PROPER LUBRICANTS ARE IN THE GEAR CASE AND AIR MOTOR LUBRICATOR.

3F) VERIFY PROPER ADJUSTMENT OF THE AIR MOTOR LUBRICATOR.

NOTE: IF THE AIR MOTOR LUBRICATOR IS FOUND TO BE OUT OF ADJUSTMENT OR IS NOT FUNCTIONING, AND MAY HAVE BEEN SO FOR AN EXTENDED PERIOD OF TIME, THE AIR MOTOR VANES MAY BE STICKING IN THE ROTOR. IF THIS IS SUSPECTED, TURN OFF THE AIR SUPPLY AND LOCK OUT THE SUPPLY VALVE. REMOVE THE AIR LINES AT THE AIR MOTOR AND PUMP 2 OR 3 SQUIRTS OF RECOMMENDED OIL INTO BOTH MOTOR PORTS, AND RECONNECT THE AIR LINES. OPEN THE FAST SPEED FLOW CONTROL VALVE FULLY AND OPEN THE MAIN AIR SUPPLY VALVE. THROUGH THE MACHINE CONTROL, EXTEND THE TURRET, RETRACT THE SHOT PIN, AND RUN THE MOTOR CW AND CCW FOR FIVE MINUTES. RE-SET THE FAST SPEED AS DESCRIBED IN SECTION 4-A1. CHECK THAT THE PROPER LUBRICANT IS BEING USED IN THE LUBRICATOR AND RE-SET THE LUBRICATOR AS DESCRIBED IN SECTION 5-D1.

3G) OUT OF BALANCE CONDITION OF TOOL PLACEMENT ON THE TURRET DISC.
A MAXIMUM OUT OF BALANCE OF TOOLS IS 10 POUNDS.

3H) VERIFY THAT THE TOOLING IS NOT INTERFERING WITH THE MACHINE OR WORK PIECE.

4) EXCESSIVE AIR MOTOR LUBRICATION EXHAUSTING FROM VALVES.

4A) RE-SET AIR MOTOR LUBRICATOR AS DESCRIBED IN SECTION 5-D1.

5) TURRET ROTATES BUT ATTEMPTS TO RE-CLAMP BETWEEN STATIONS

5A) USING A PRY BAR, ROTATE THE TURRET DISC TO THE CLOSEST STATION. THE TURRET WILL SNAP INTO THE LOCKED POSITION UNDER SPRING FORCE.
CAUTION: KEEP HANDS CLEAR

(continued)

Continued from previous page.

5A) ADJUST AIR MOTOR SLOW SPEED CONTROL AS DESCRIBED IN SECTION 4-A2.

6) ERRATIC TURRET INDEXING.

6A) OUT OF BALANCE CONDITION OF TOOL PLACEMENT ON THE TURRET DISC.
A MAXIMUM OUT OF BALANCE OF TOOLS IS 10 POUNDS.