

Bell Aerospace Company DIV OF **textrol**

POST OFFICE BOX 1 BUFFALO, NEW YORK 14240

Report No. 8586-950001 A

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TELEOPERATOR TECHNOLOGY
AND
SYSTEM DEVELOPMENT

FINAL REPORT
APRIL 1972

VOLUME II

APPENDIX E

CR-123748

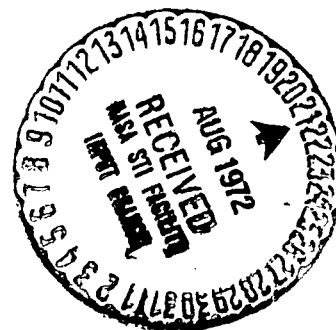
(NASA-CR-123748) TELEOPERATOR TECHNOLOGY
AND SYSTEM DEVELOPMENT. VOLUME 2: APPENDIX
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Bell Aerospace Company DIVISION OF **textron**

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TELEOPERATOR TECHNOLOGY
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APRIL 1972

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APPENDIX E

Prepared Under Contract NAS 8-27021 for

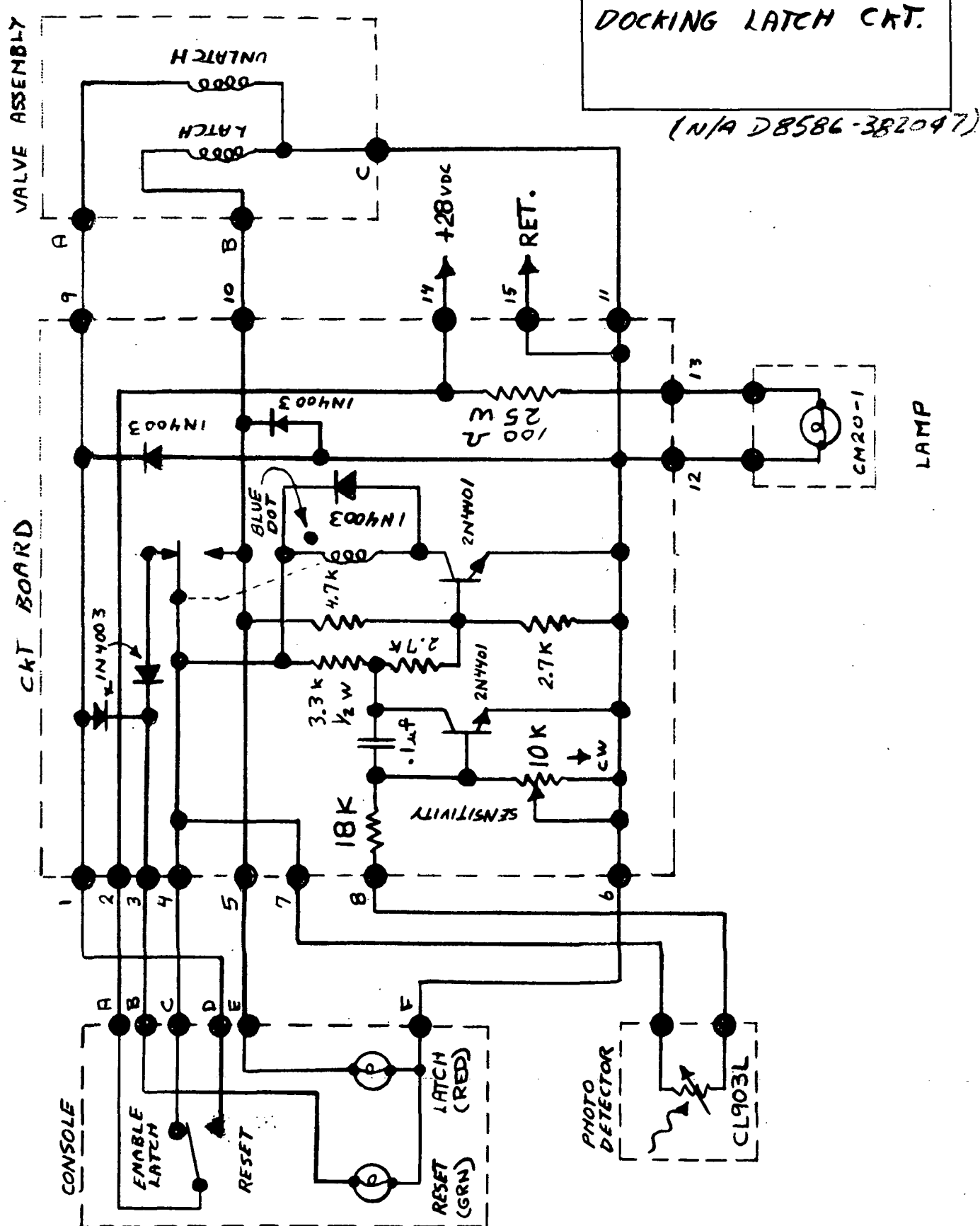
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
ASTRIONICS LABORATORY
GEORGE C. MARSHALL SPACE FLIGHT CENTER

CONTROL NO. DCN 1-1-40-10374

APPENDIX E

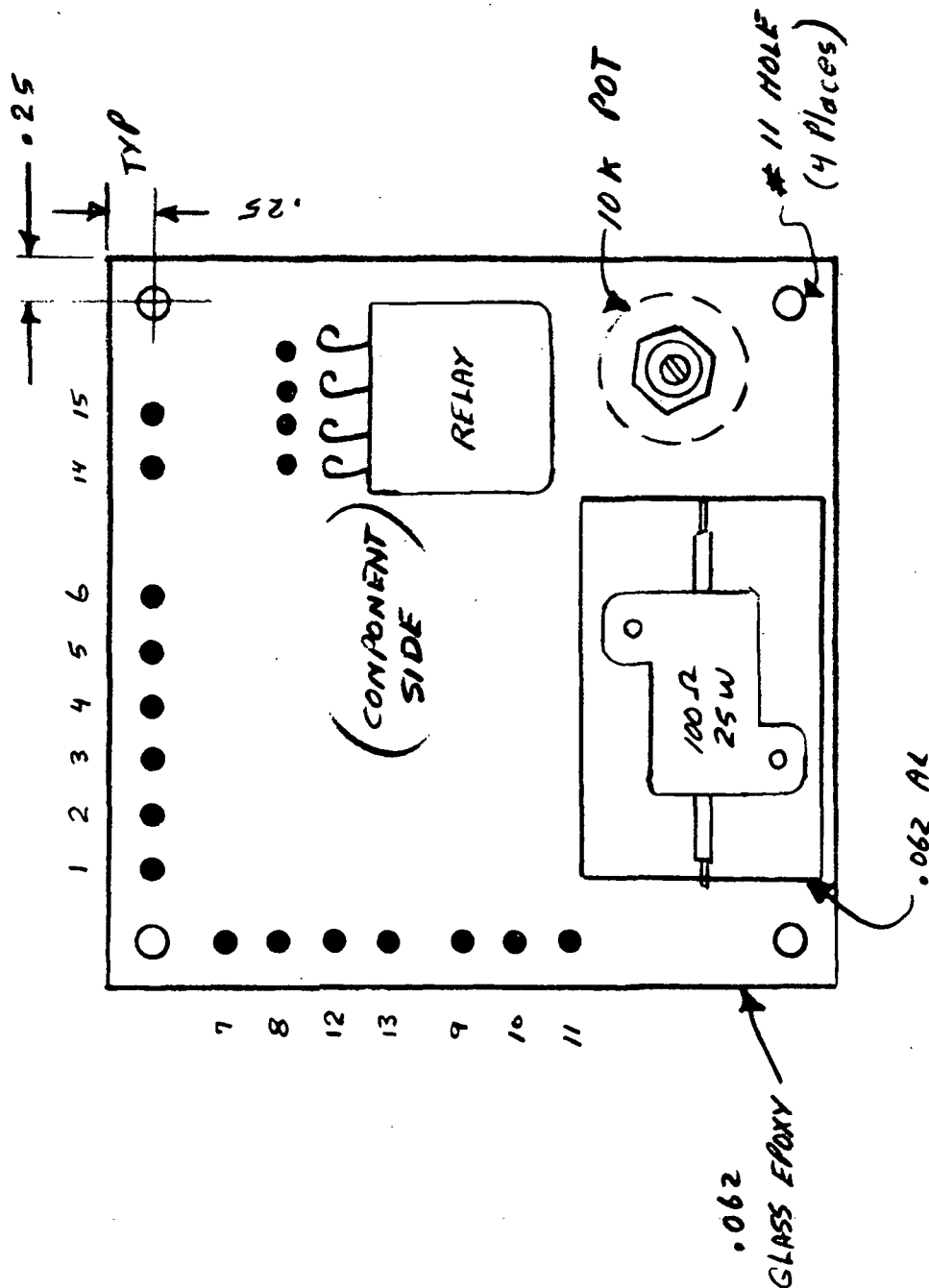
This appendix contains drawings of equipment designed and fabricated by Bell Aerospace to affect the integration of the Government furnished Controllers, Displays and Manipulators with the Bell Remote Maneuvering Unit. Schematic diagrams of the Master and Lever controllers are also included for reference.

Because no contractual requirement exists for deliverable drawings, the drawings included herein were not refined beyond the "working drawing" or engineering sketch format.



**LAYOUT FOR DOCKING
LATCH CKT**

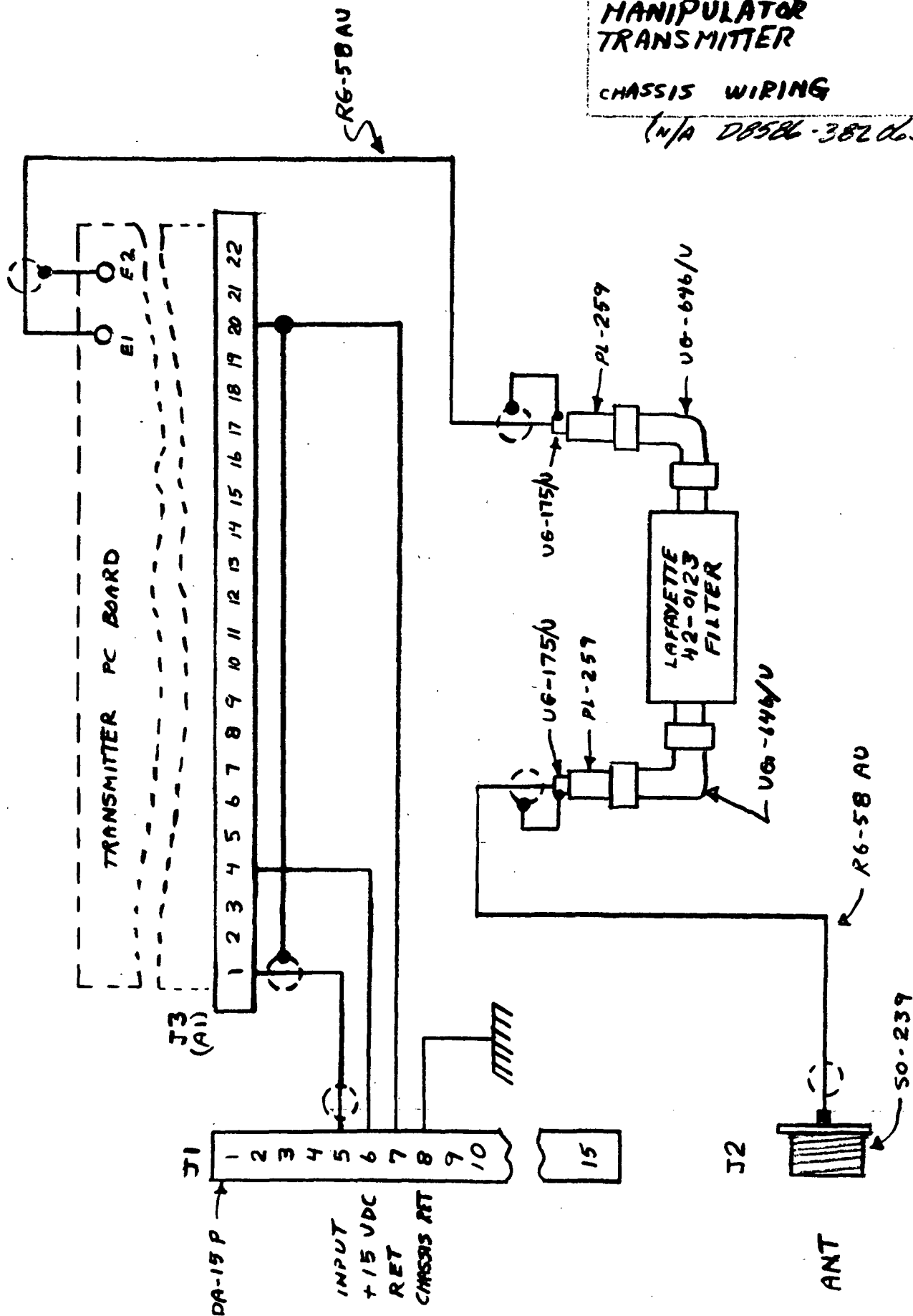
(N/A D8586-382047)



MANIPULATOR TRANSMITTER

CHASSIS WIRING

(N/A D8586-382052)

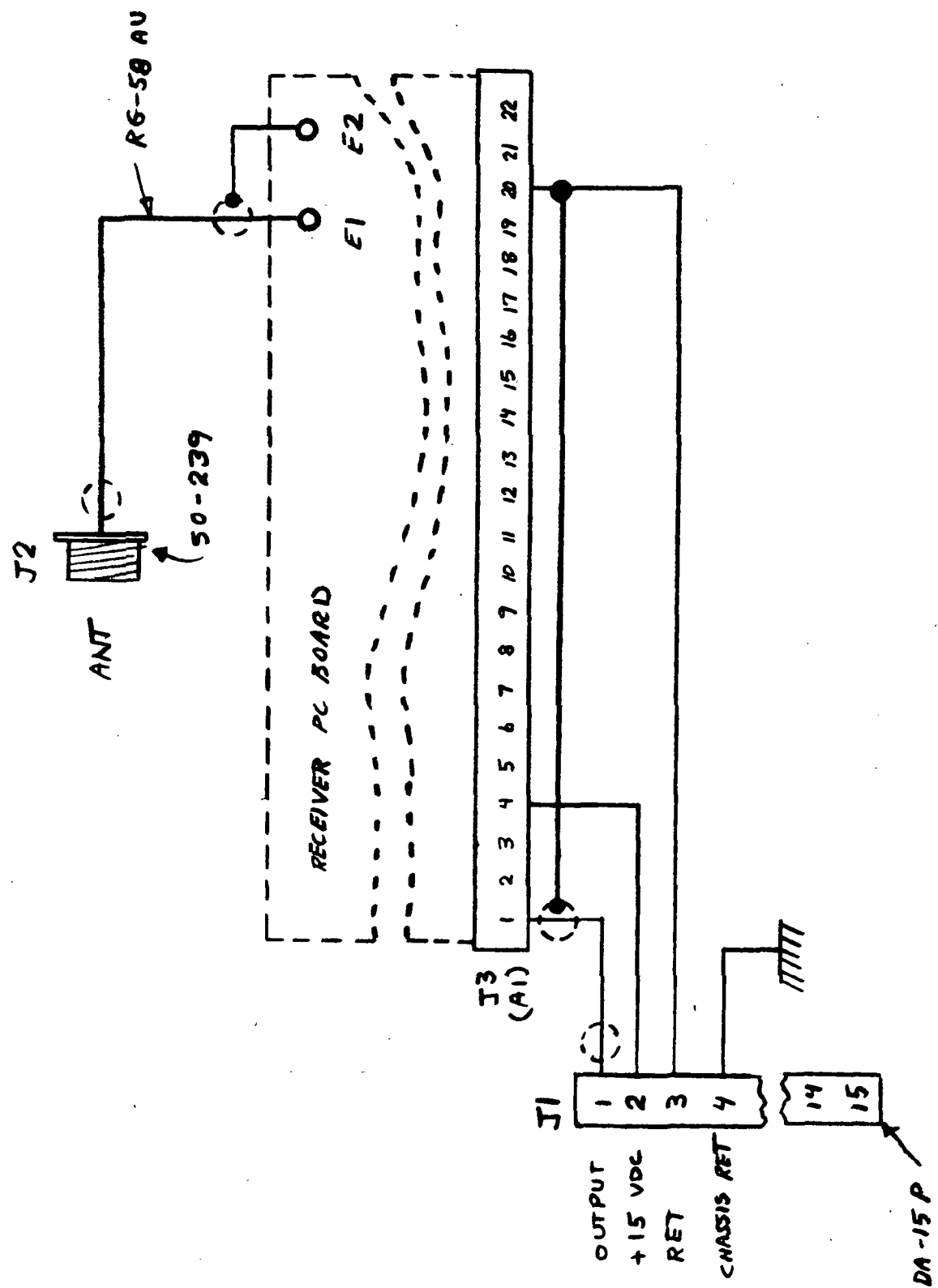


14. Letter Date 5-3-71

AEROSPACE TECHNOLOGY

Model _____ Page _____
Airplane _____ Report D8586-38205

MANIPULATOR
RECEIVER
CHASSIS WIRING
(N/A D8586-382047)



Form 6175

9-30-71

BEAL AEROSYSTEMS COMPANY

Model

Page

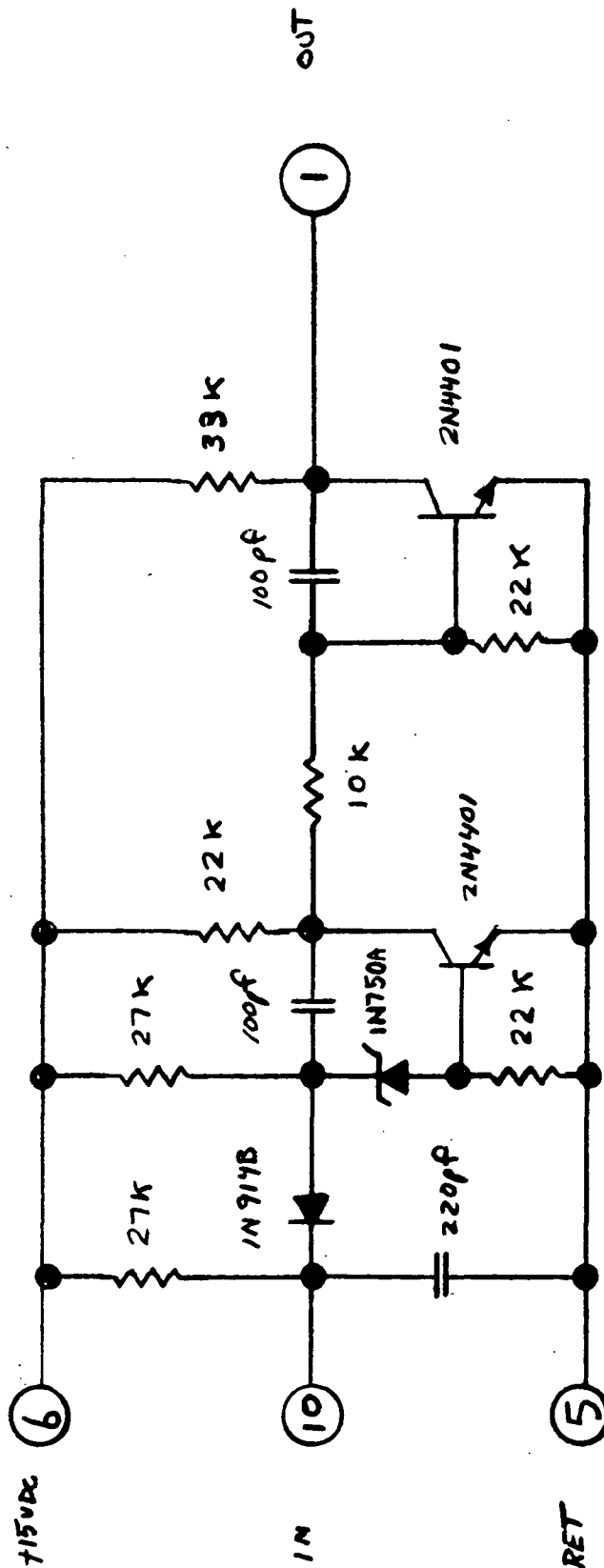
Airplane

Report

D85A-38705

MANIPULATOR DECODER
INPUT BUFFER
BOARD A1

(NIA D8586-382050)



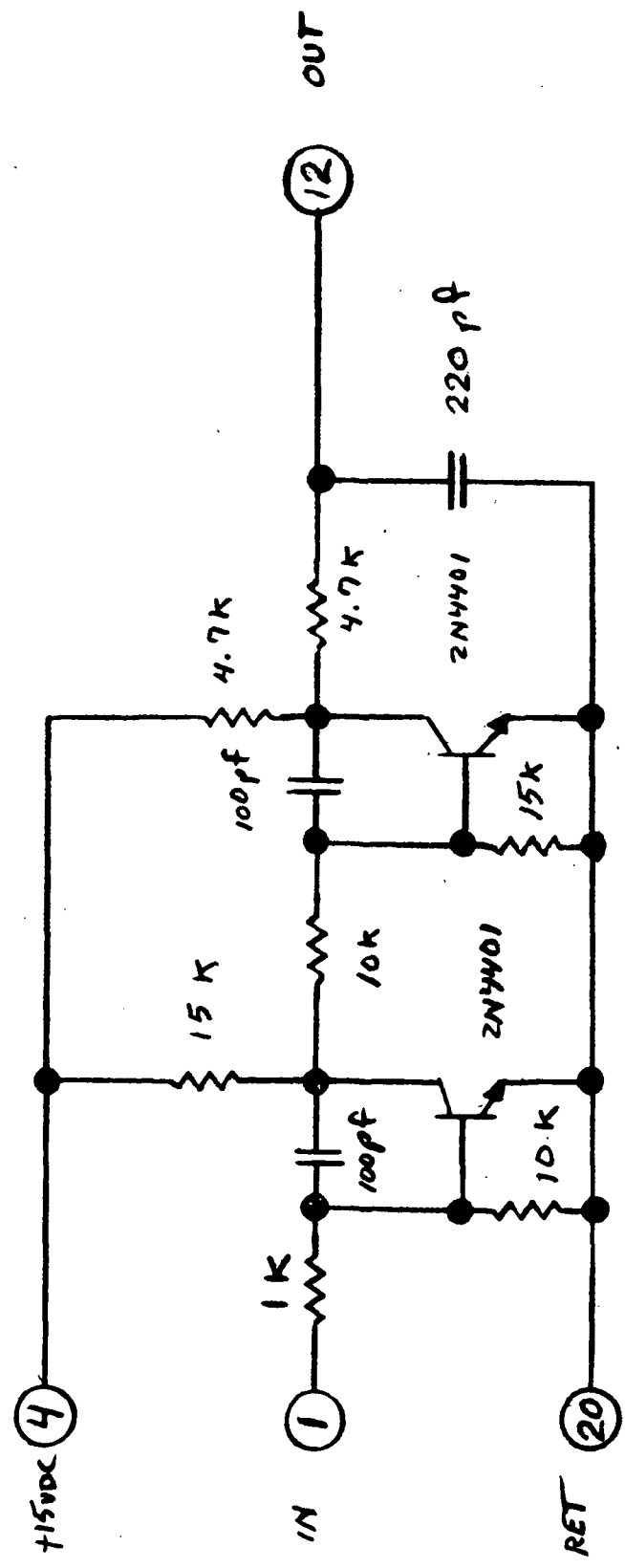
By H. Latta

Date 4-30-71

BELL AEROSYSTEMS COMPANY

Model _____ Page DB586-382055
Airplane _____ Report _____

**MANIPULATOR ENCODER
OUTPUT BUFFER
BOARD A1**
(N/A D B586-382051)



Rev 100

Date 5-2

BELL AEROSYSTEMS COMPANY

Model

Page

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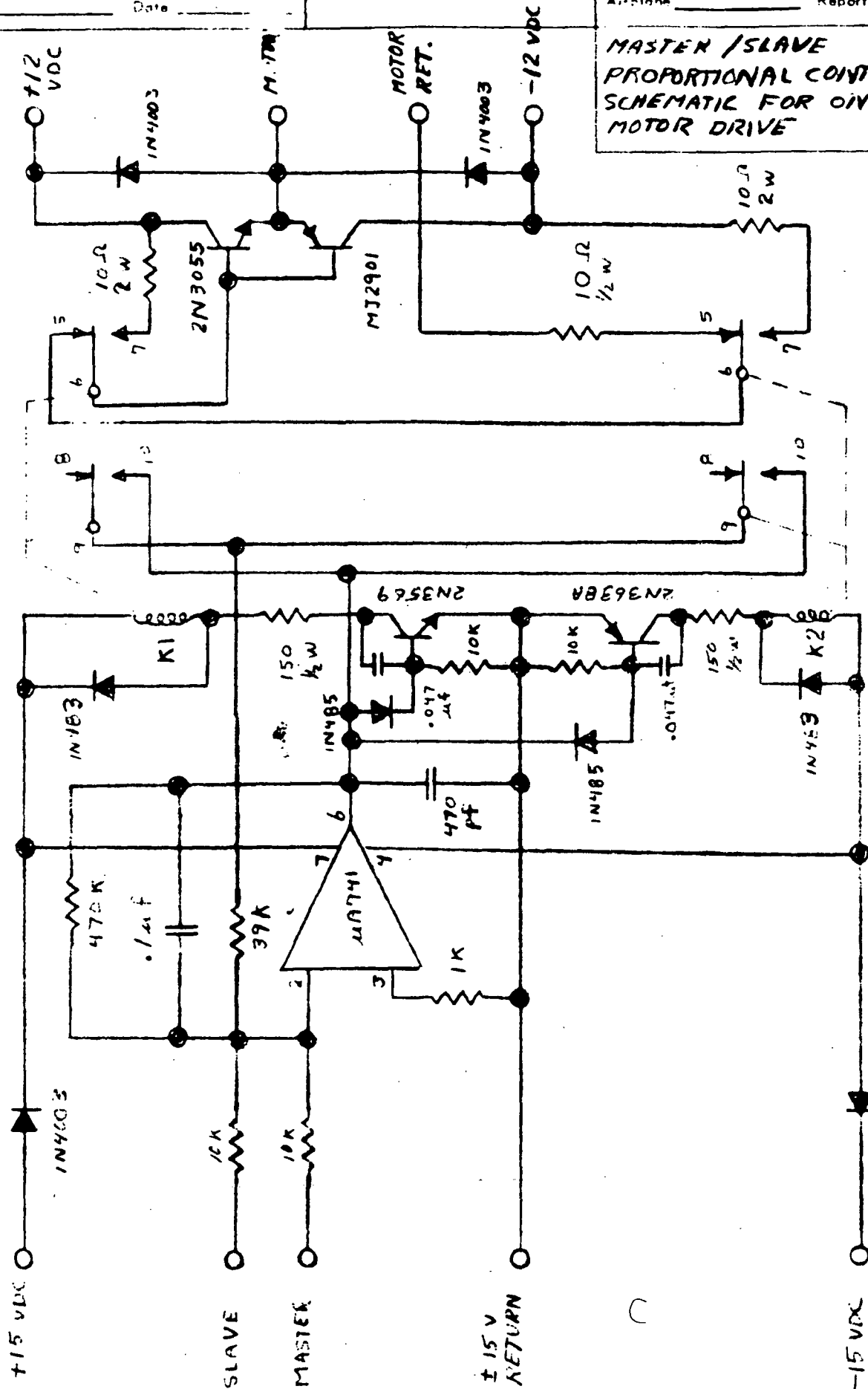
Date

Airplane

Report

**MASTER / SLAVE
PROPORTIONAL CONTROL
SCHEMATIC FOR ONE
MOTOR DRIVE**

Form 0170



JOYSTICK CONTROL -- ELECTRICAL SCHEMATIC (BLOCK DIAGRAM)

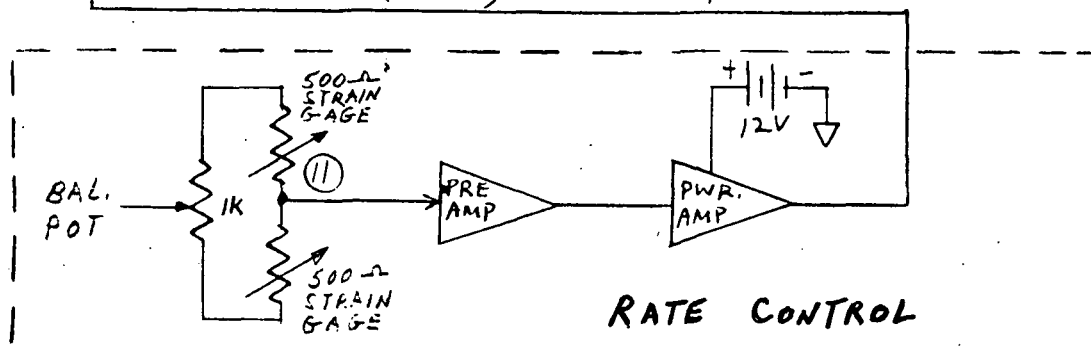
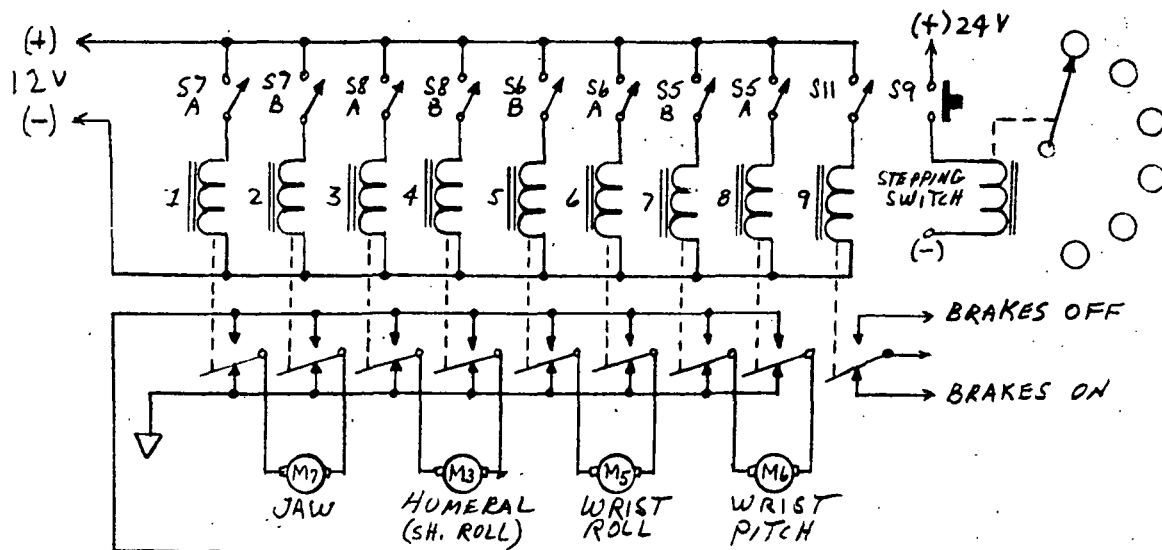
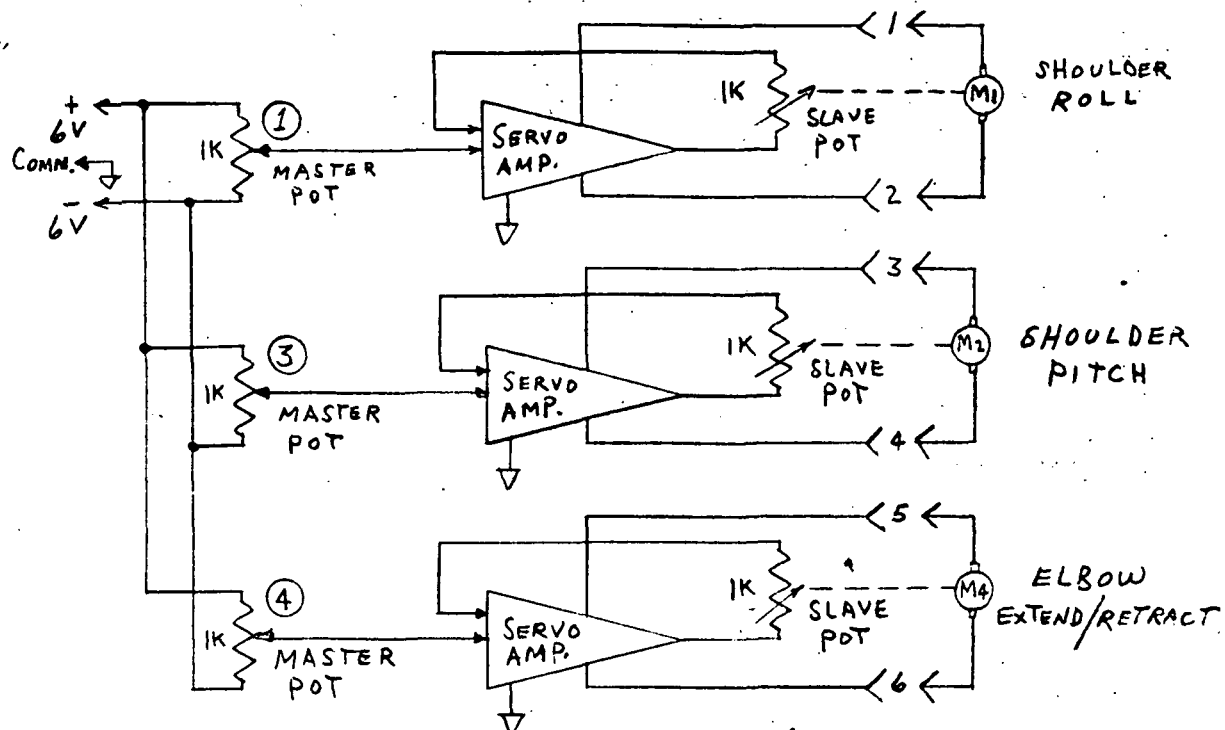
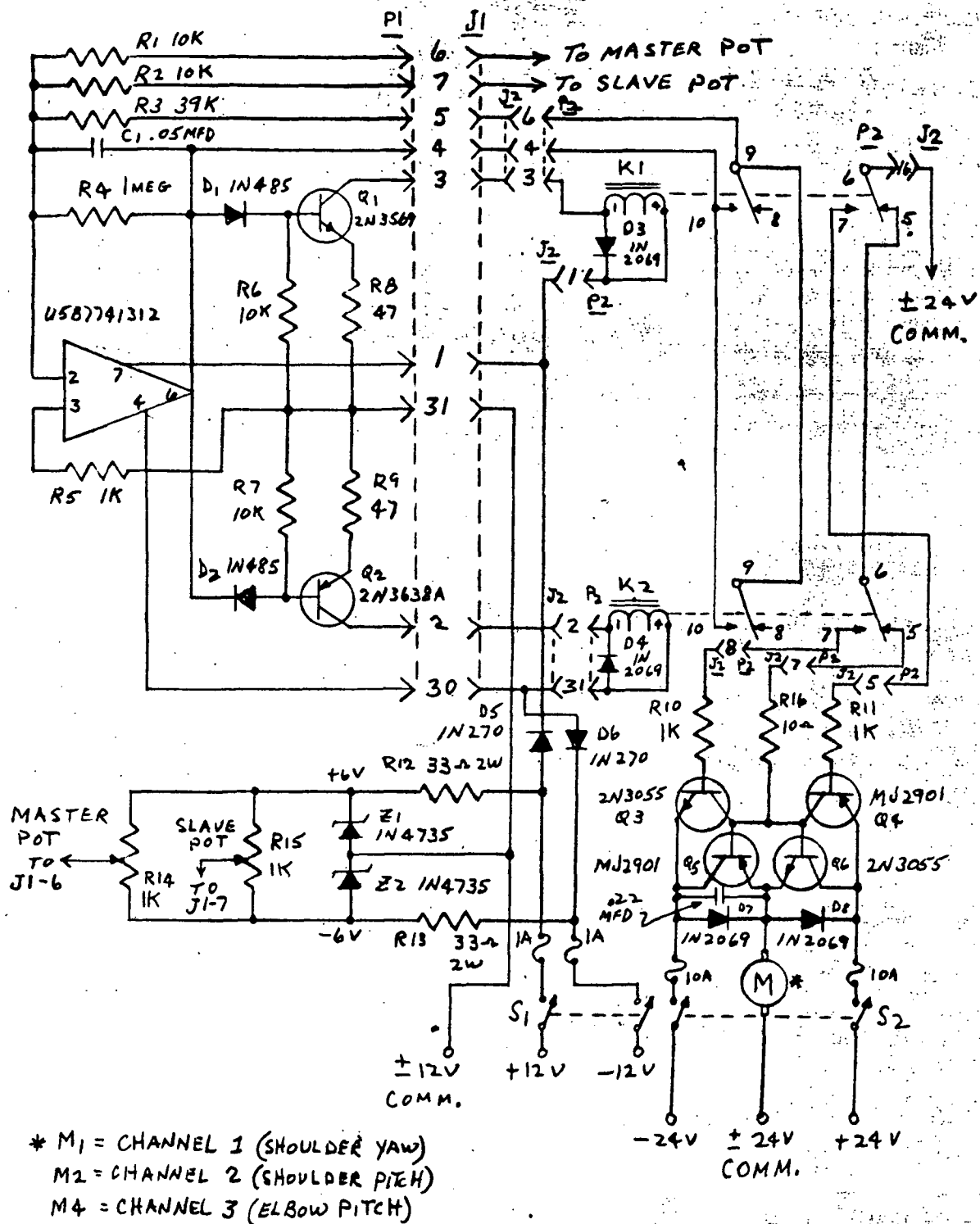


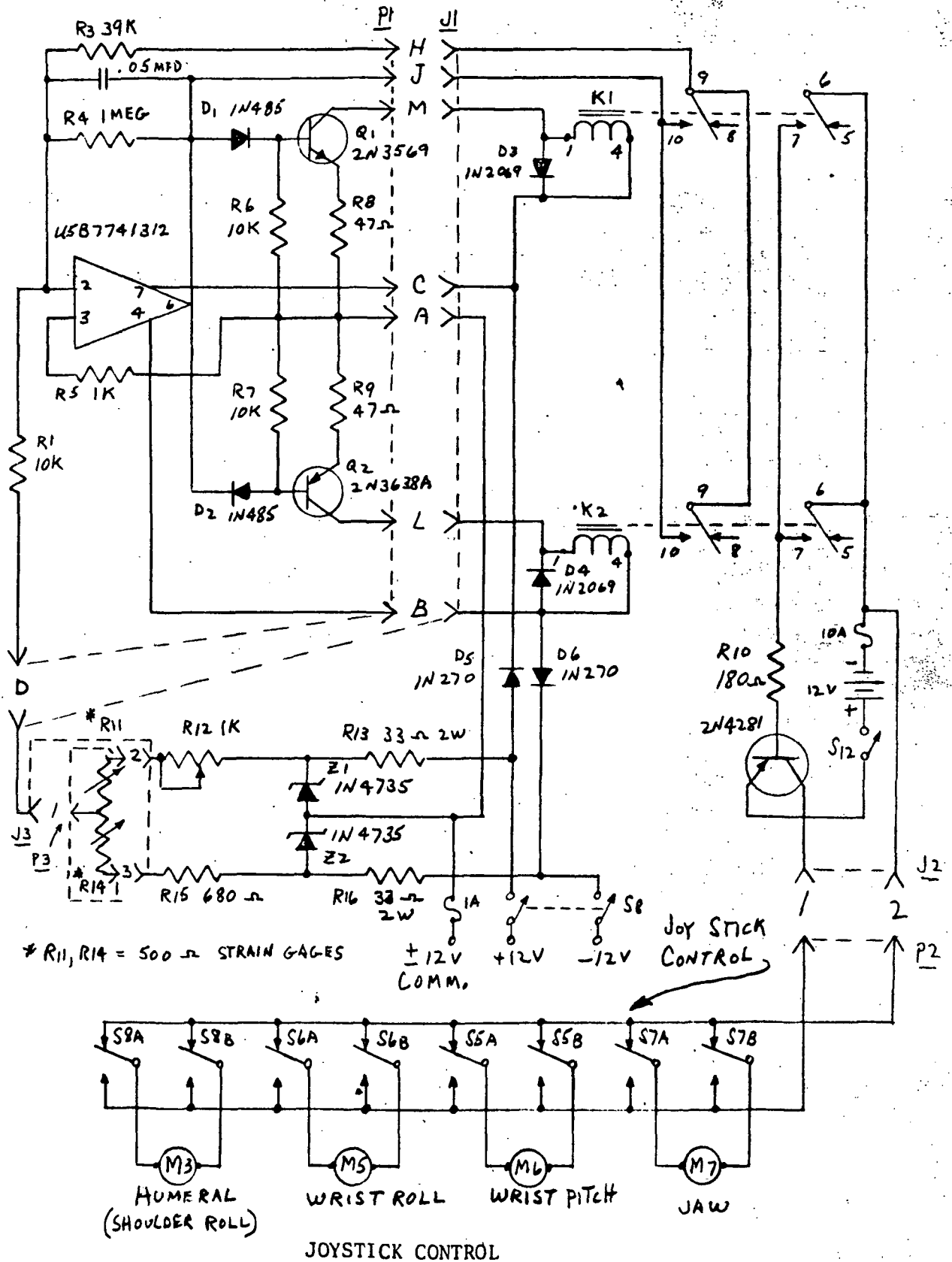
Figure 3



JOYSTICK CONTROL

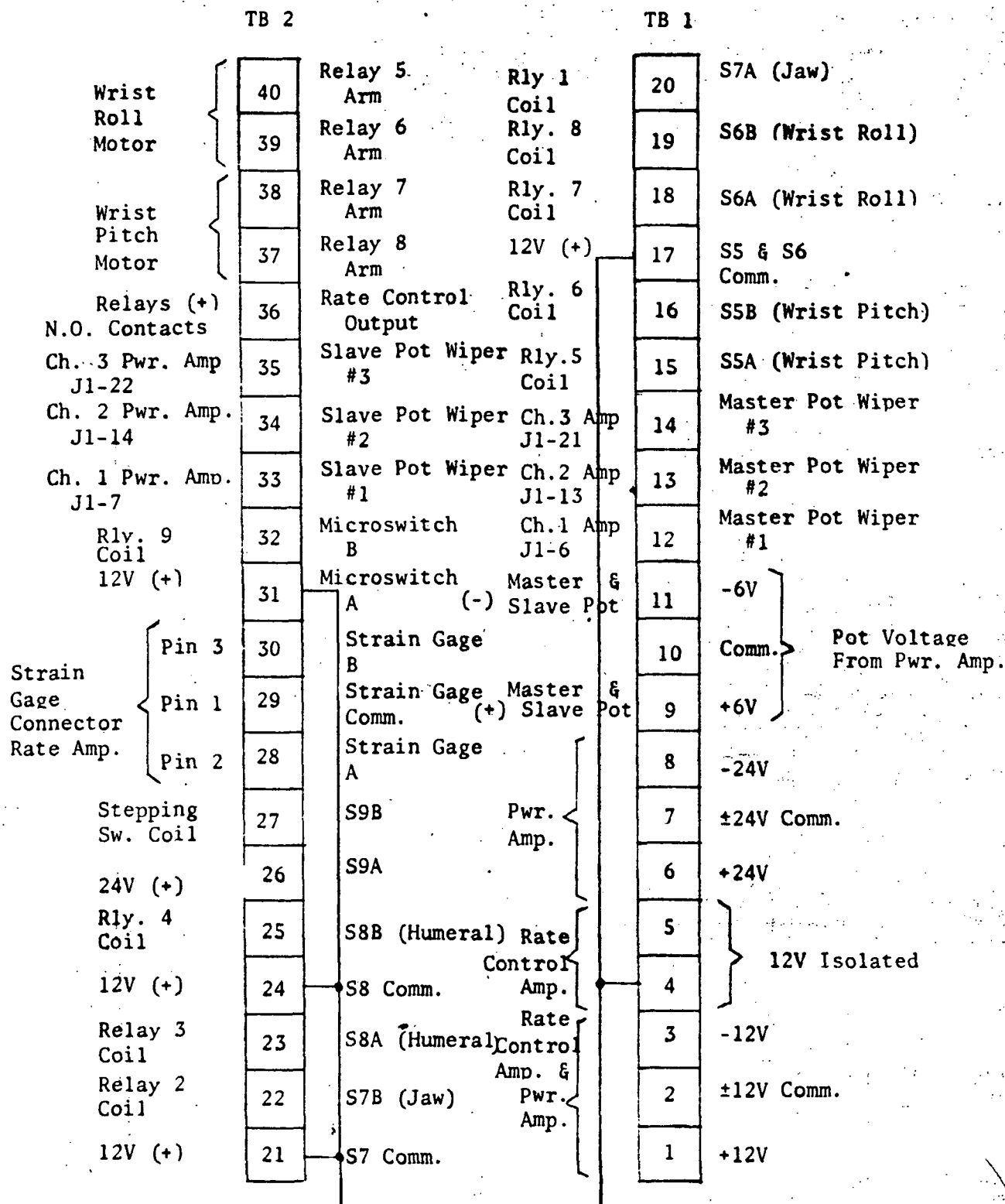
Schematic Diagram - Servo Amplifier. one channel

Figure 4



Schematic Diagram - Rate Control

Figure 5



TERMINAL BOARDS 1 and 2

Figure 6

TB. 3

Ch. 1 Pwr. Amp.		Ch. 2 Pwr. Amp.		Ch. 3 Pwr. Amp.		Relay 3 Arm	Relay 4 Arm	Relay 1 Arm	Relay 2 Arm
41	42	43	44	45	46	47	48	49	50
Shoulder (Yaw) Motor		Shoulder Ext./Ret. Motor (Pitch)		Elbow Ext./Ret. Motor (Pitch)		Humeral Roll Motor (Shoulder Roll)		Jaw Motor	

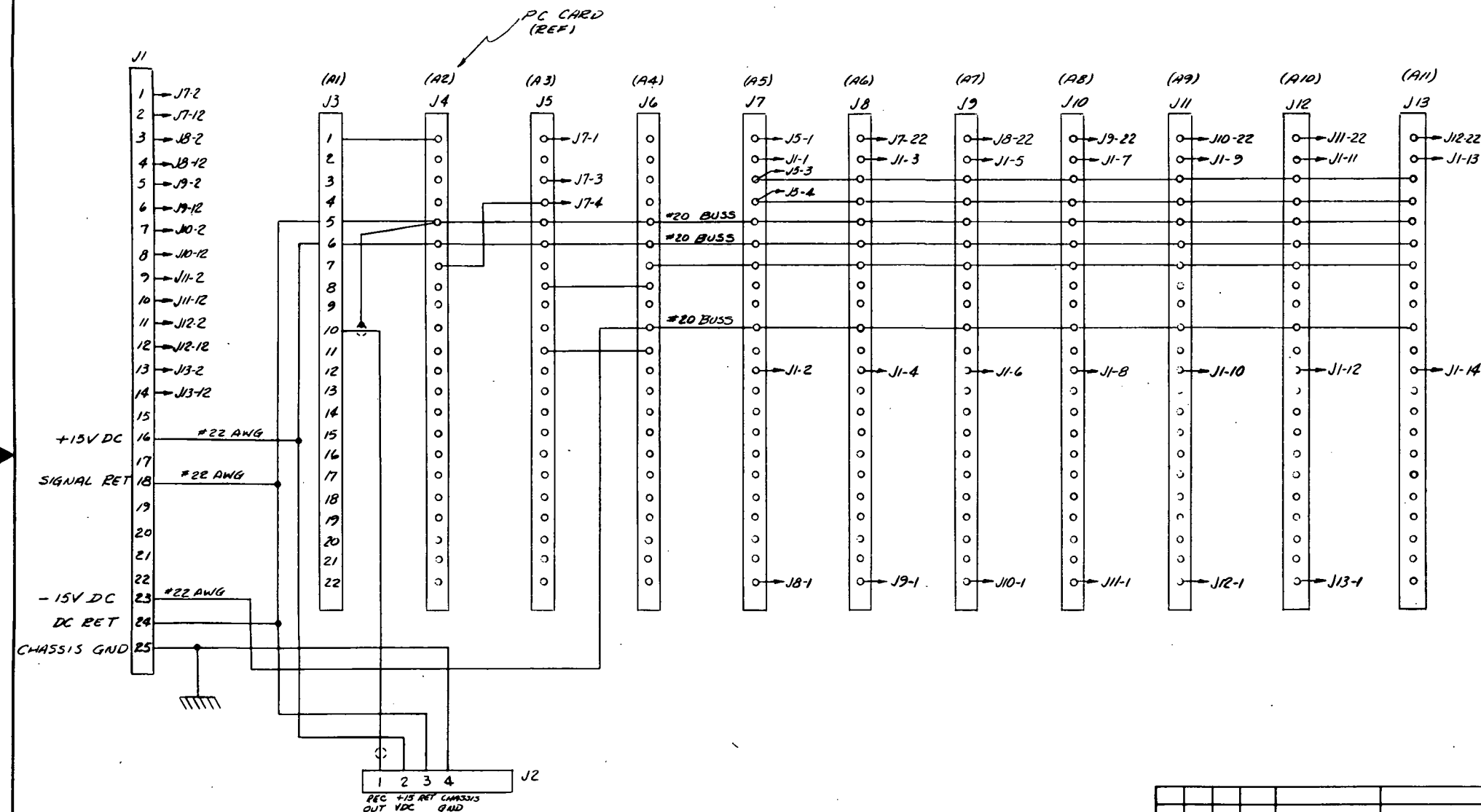
TERMINAL BOARD 3

Figure 7

FOLDOUT FRAME 1

FOLDOUT FRAME

2



1. ALL WIRES 26 GA. UNLESS OTHERWISE STATED

NOTE:-

SCHEMATICS (REF)

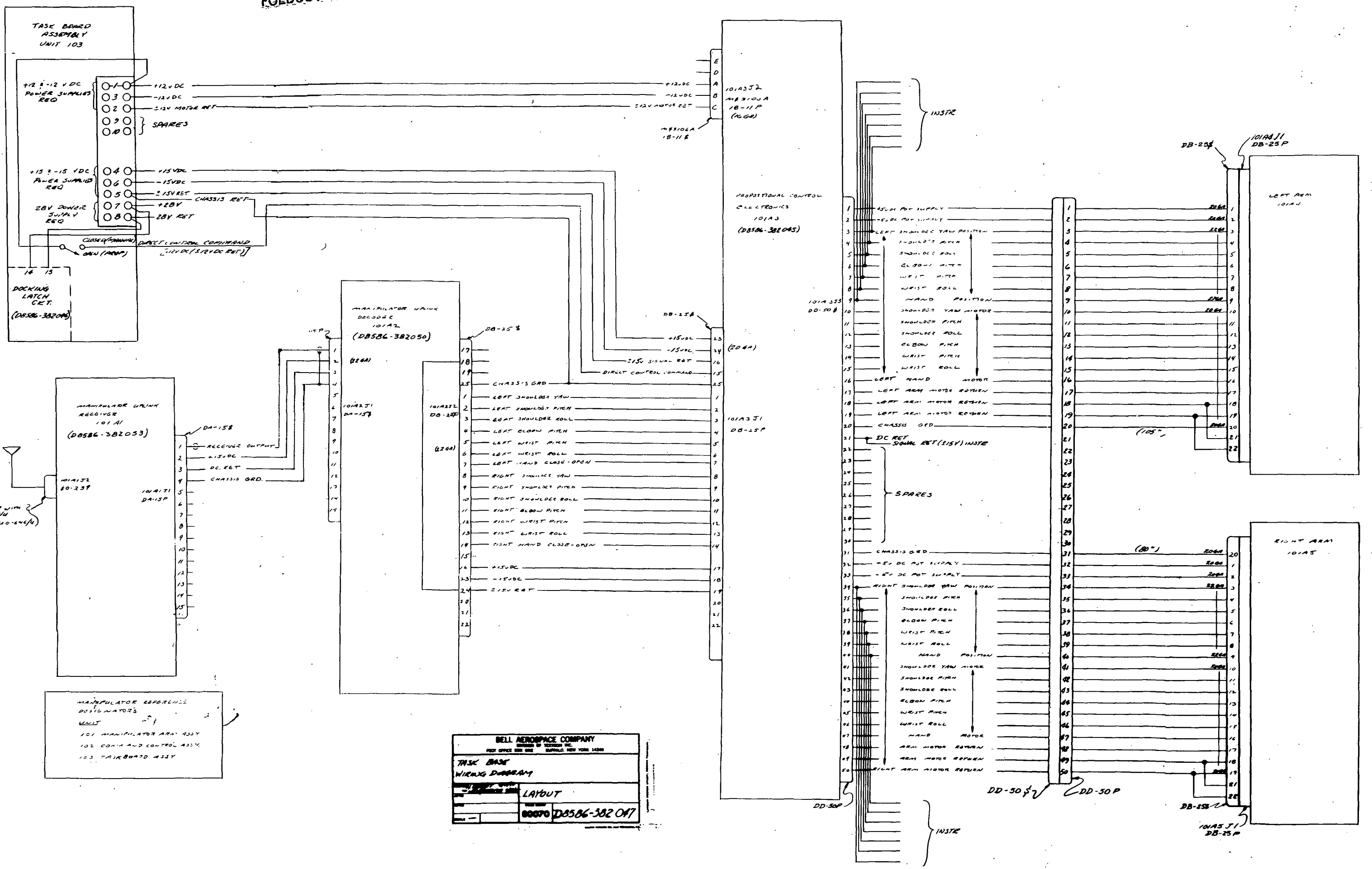
PC CH2D A1 - D8586-382054
A2 057
A3 058
A4 059
45 THRU 111 - D8586-382060

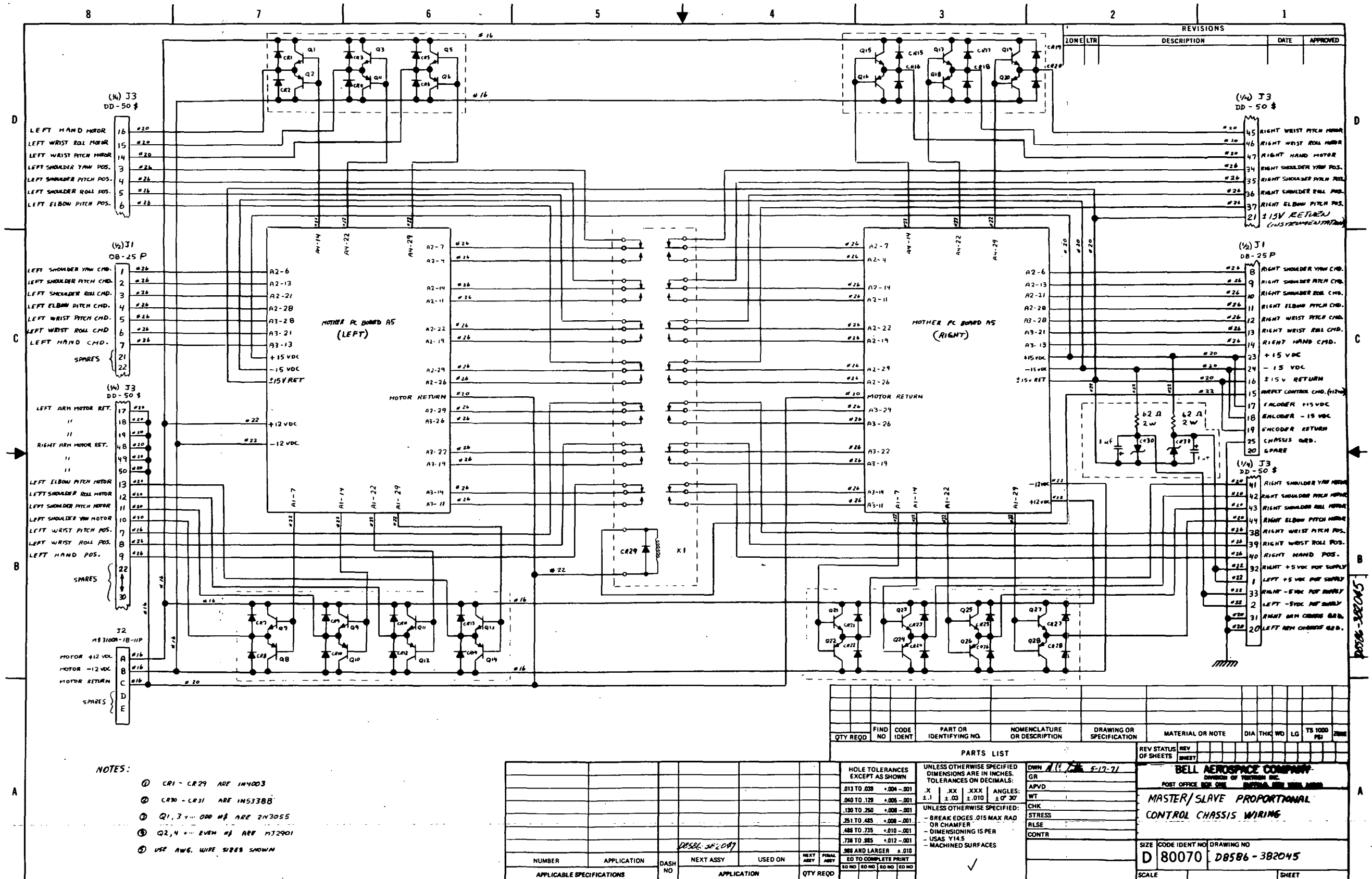
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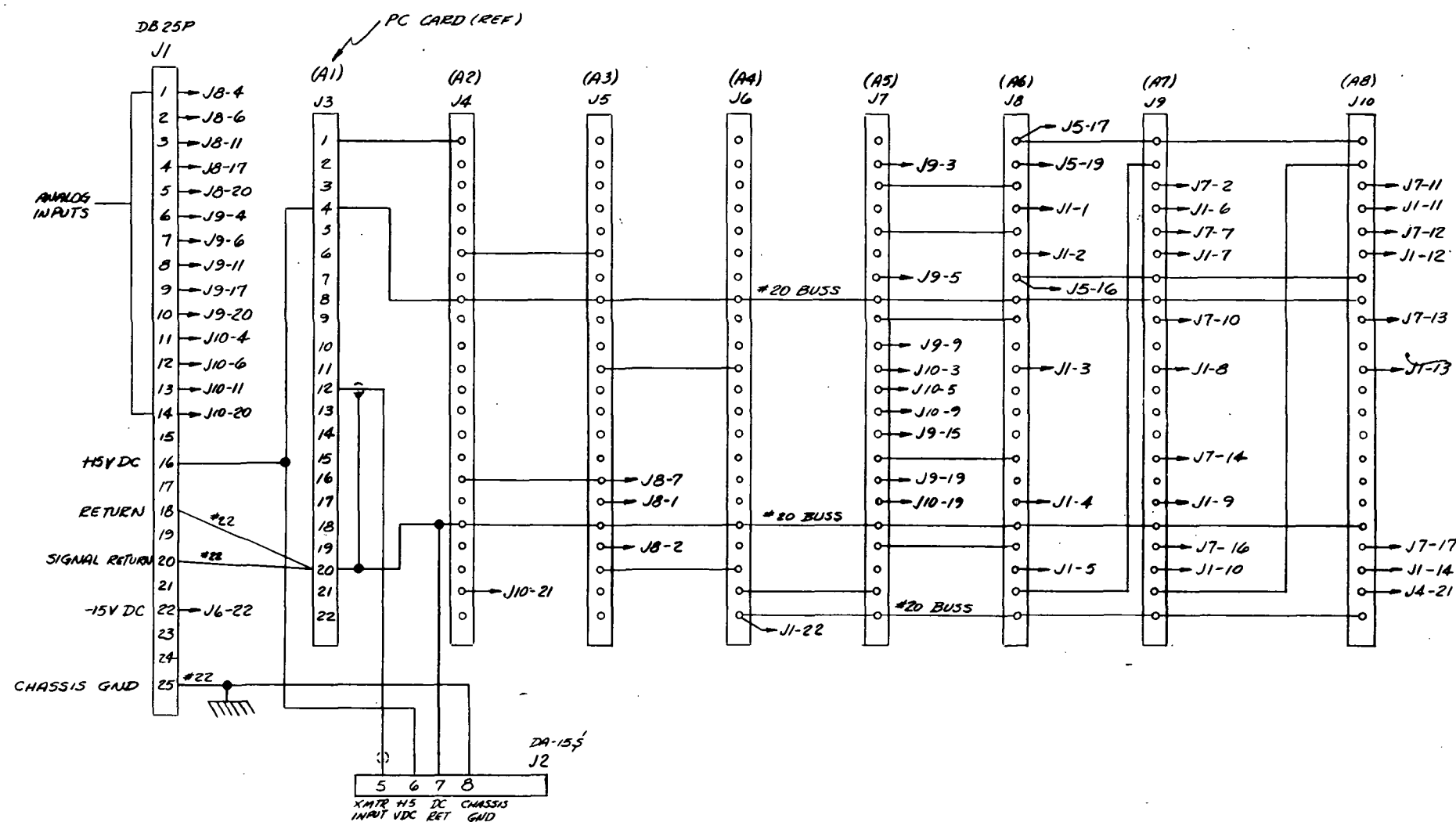
DOCK-382050

FOLDOUT FRAME 1

FOLDOUT FRAME 2





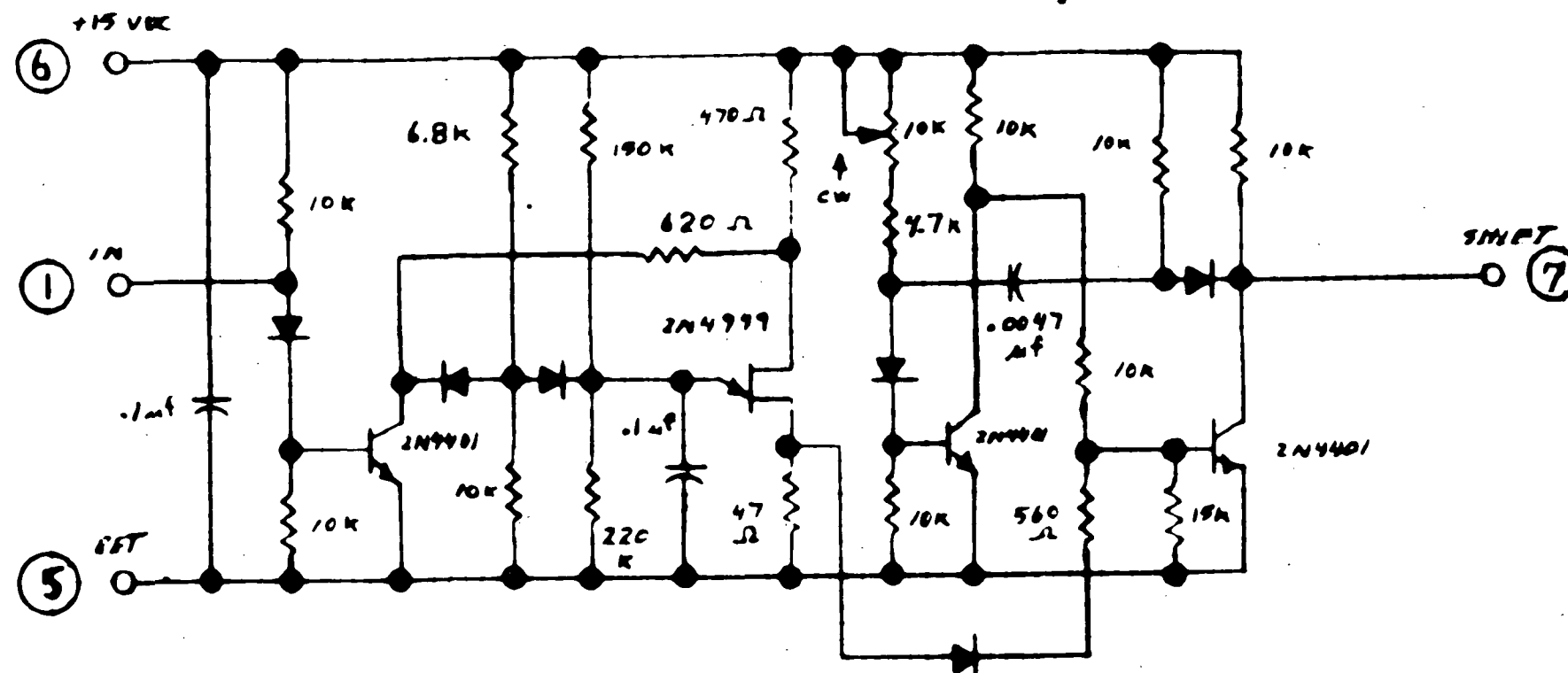


SCHEMATICS REF
 PC CARD A1 - DB586-382055
 A2 061
 A3 062
 A4 063
 A5 064
 A6 THRU A8 - DB586-382056

1. ALL WIRES #26 AWG WHITE TEFLON
 EXCEPT AS NOTED.
 NOTE:-

QTY REQD		FIND NO	CODE IDENT	PART OR IDENTIFYING NO	NOMENCLATURE OR DESCRIPTION	DRAWING OR SPECIFICATION	MATERIAL OR NOTE	DIA	THK	WID	LG	TS	WID	PTH
PARTS LIST														
HOLE TOLERANCES EXCEPT AS SHOWN:														
.013 TO .030 ±.004 - .001														
.030 TO .125 ±.008 - .001														
.130 TO .250 ±.012 - .001														
.251 TO .485 ±.020 - .001														
.486 TO .735 ±.018 - .001														
.736 TO .895 ±.012 - .001														
.896 AND LARGER ±.010														
80 TO COMPLETE PRINT														
80 NO 80 NO 80 NO 80 NO														
UNLESS OTHERWISE SPECIFIED:														
DIMENSIONS ARE IN INCHES.														
TOLERANCES ON DECIMALS:														
.XX .XX .XX .XX .XX .XX .XX .XX .XX .XX .XX .XX .XX .XX .XX														
ANGLES: ±.1 ±.05 ±.010 ±.0° 30'														
UNLESS OTHERWISE SPECIFIED:														
BREAK EDGES .015 MAX RAD														
OR CHAMFER														
DIMENSIONING IS PER														
ANSI Y14.5														
MACHINED SURFACES														
OWN J. M. HARKLE 7-71														
BELL AEROSPACE COMPANY														
DIVISION OF TEXTRON INC.														
POST OFFICE BOX ONE BUFFALO, NEW YORK 14200														
MANIPULATOR 14 CHANNEL														
ENCODER														
CHASSIS WIRING														
SIZE CODE IDENT NO DRAWING NO														
D 80070 DB586-382051														
SCALE SHEET														

LTR	DESCRIPTION	DATE	APPROVED



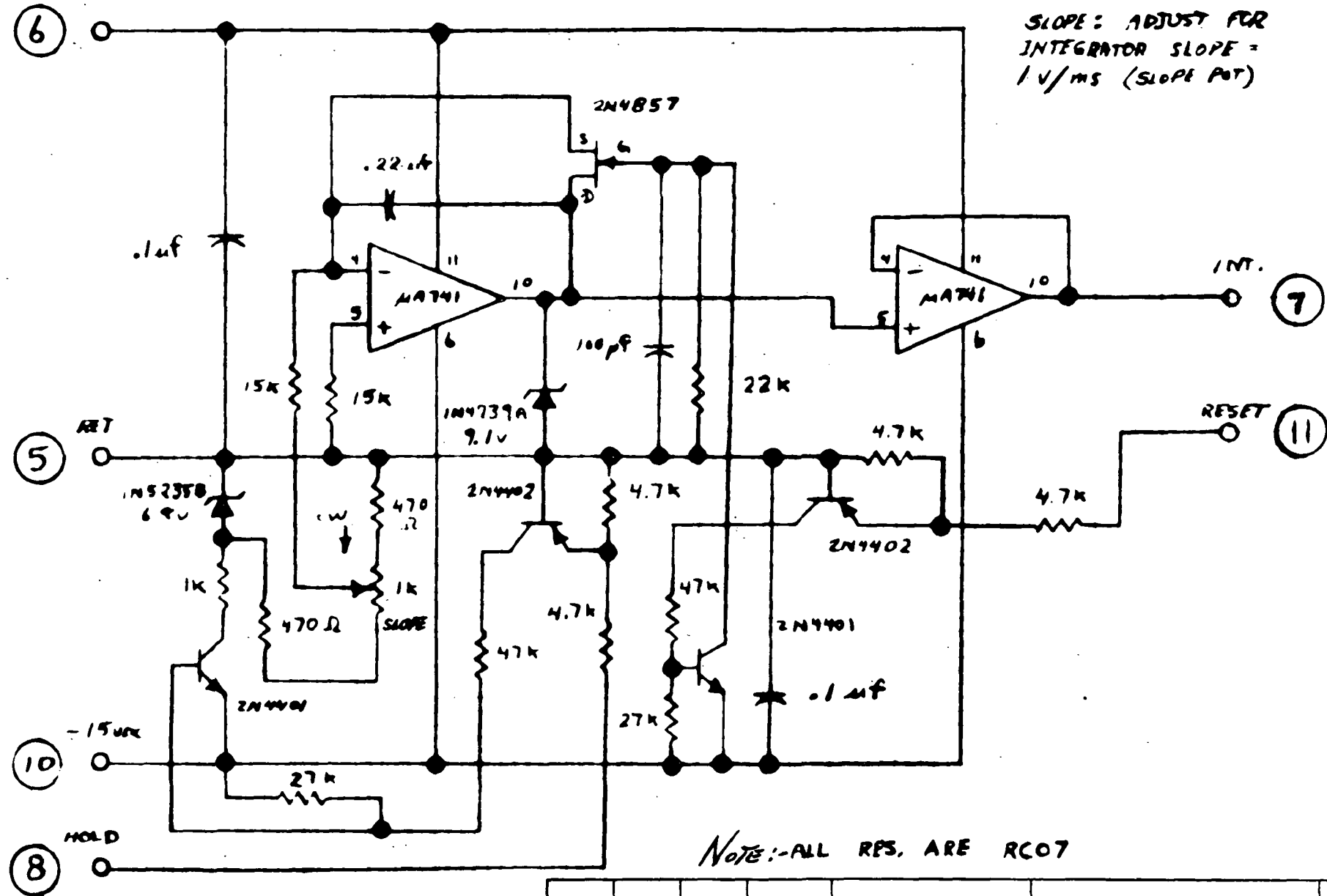
ALL RIS ARE PLOT
ALL DRADES IN 9MB

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						UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS:	DESIGN <i>H LATKA 3-1571</i>	BELL AEROSPACE COMPANY
						X XX XXX ANGLES: $\pm .1 \pm .03 \pm .010 \pm 0.5^\circ$	APPD	DIVISION OF TEXTRON INC.
						SUPERSEDES	CHK <i>Jmm</i>	POST OFFICE BOX ONE BUFFALO, NEW YORK 14240
							STRESS	MANIPULATOR - DECODER
							WT	BOARD-A2
							REL	
							CNTR NO.	
	<i>D8586-382056</i>							SIZE CODE IDENT NO.
DASH NO.	NEXT ASSY	USED ON	NEXT ASSY	FINAL ASSY		SUPERSEDED BY		B 80070 <i>D8586-382057</i>
	APPLICATION		QTY REQD					SCALE — SHEET



650788-78580



SLOPE: ADJUST FOR
INTEGRATOR SLOPE =
1 V/ms (SLOPE POT)

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

NOTE: - ALL RPS. ARE RCO7

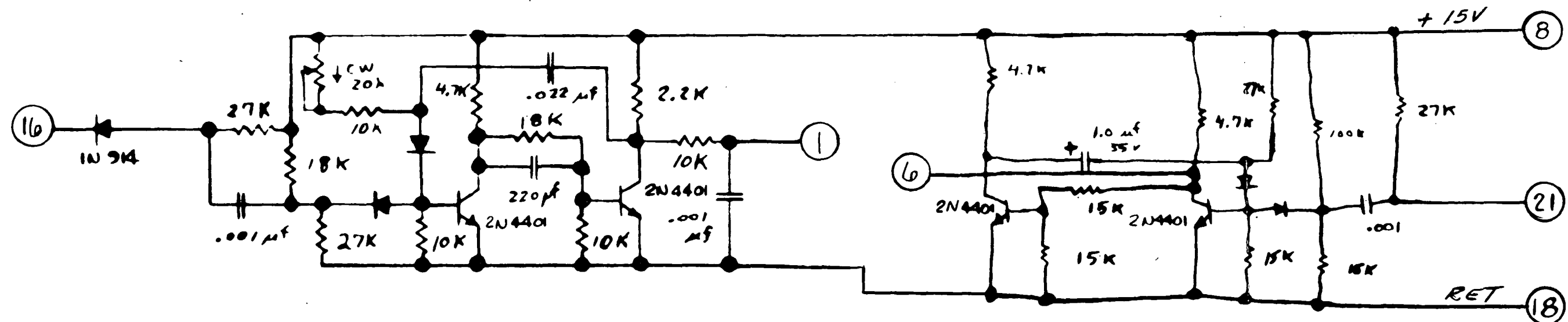
QTY REQD	FIND NO.	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR NOTE	COMMERCIAL DESIGNATION	SPECIFICATION	DIA	THK	W	LG	TS 1000 PSI	UNIT WT
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PARTS LIST

EO NO.	SH OF SH	NUMBER	APPLICATION	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON DECIMALS		DESIGN H LATKA 3/15/71	BELL AEROSPACE COMPANY DIVISION OF TEXTRON INC POST OFFICE BOX ONE BUFFALO, NEW YORK 14240	
EO TO COMPLETE PRINT				X	XX	XXX	ANGLES	MANIPULATOR DECODER
HOLE TOLERANCES EXCEPT AS SHOWN				±.1	±.03	±.010	±0° 30'	BOARD A4
.040 TO .129 +.005 - .000				SUPERSEDES				SIZE
.130 TO .250 +.006 - .000								CODE IDENT NO.
.251 TO .485 +.008 - .000				SUPERSEDED BY				80070
.486 TO .735 +.010 - .000								8586-382059
.736 TO .985 +.012 - .000				DASH NO.	NEXT ASSY	USED ON	NEXT ASSY	FINAL ASSY
.986 AND LARGER ±.010				APPLICATION	QTY REQD	SCALE — SHEET		



REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

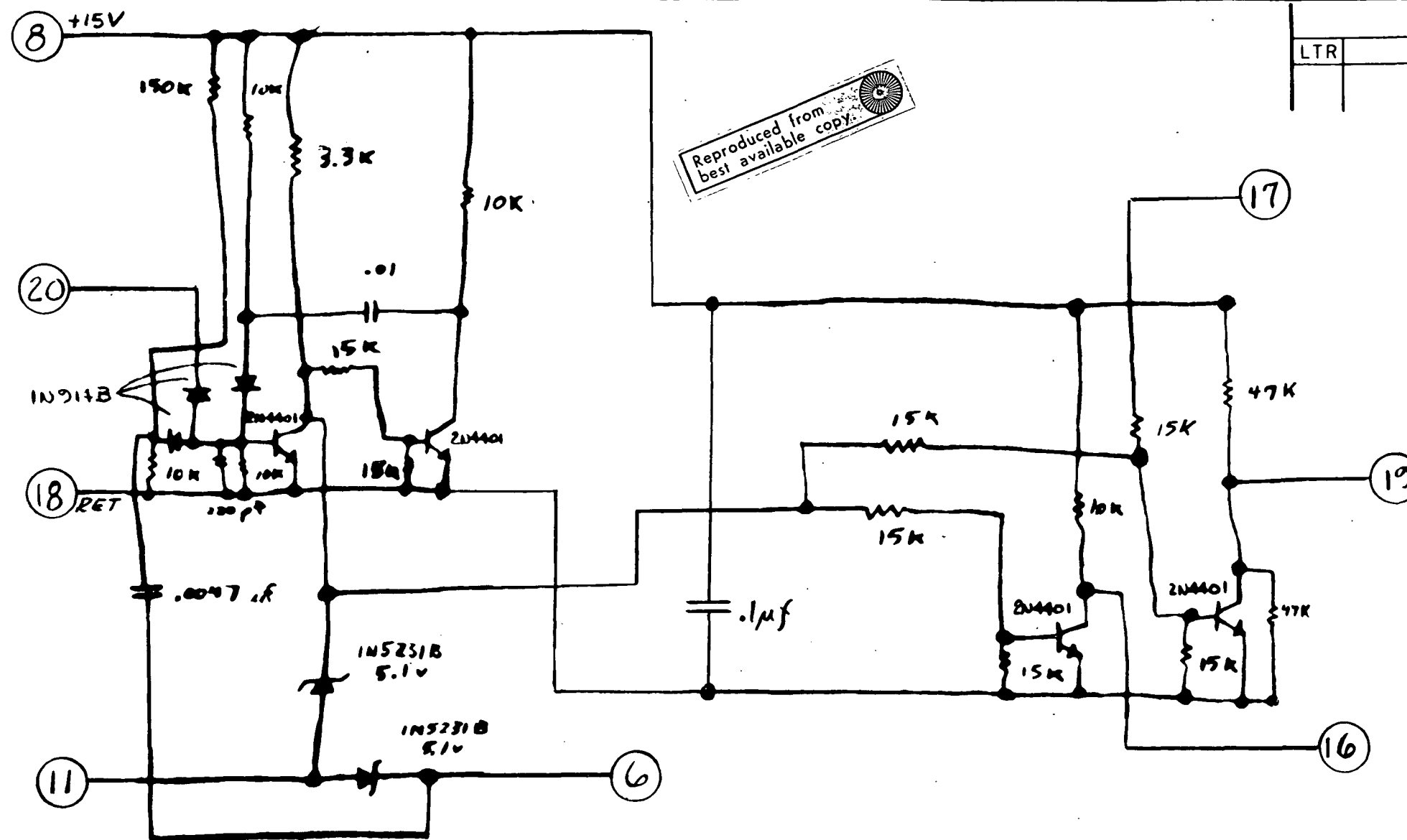


QTY REQD	FIND NO.	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR NOTE	COMMERCIAL DESIGNATION	SPECIFICATION	DIA	THK	W	LG	TS 1000 PSI	UNIT WT
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PARTS LIST

EO NO.	SH OF SH	NUMBER	APPLICATION	DASH NO.	NEXT ASSY	USED ON	NEXT ASSY	FINAL ASSY	QTY REQD	DESIGN/LATKA 5-4-71	APPD	CHK	STRESS	WT	REL	CONTR NO.	BELL AEROSPACE COMPANY DIVISION OF TEXTRON INC. POST OFFICE BOX ONE BUFFALO, NEW YORK 14240
EO TO COMPLETE PRINT		APPLICABLE SPECIFICATIONS		D8586 382051						UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. TOLERANCES ON DECIMALS:		SUPERSEDES		SUPERSEDED BY		MANIPULATOR ENCODER	
HOLE TOLERANCES EXCEPT AS SHOWN		UNLESS OTHERWISE SPECIFIED BREAK ALL SHARP EDGES APPROX .015 R OR CHAMFER								.X .XX .XXX ANGLES: ±.1 ±.03 ±.010 ±0 30°						BOARD A2	
.040 TO .129 +.005-.000																SIZE CODE IDENT NO.	
.130 TO .250 +.006-.000																B 80070 D8586-382061	
.251 TO .485 +.008-.000																SCALE — SHEET	
.486 TO .735 +.010-.010																	
.736 TO .985 +.012-.000																	
.986 AND LARGER ±.010																	

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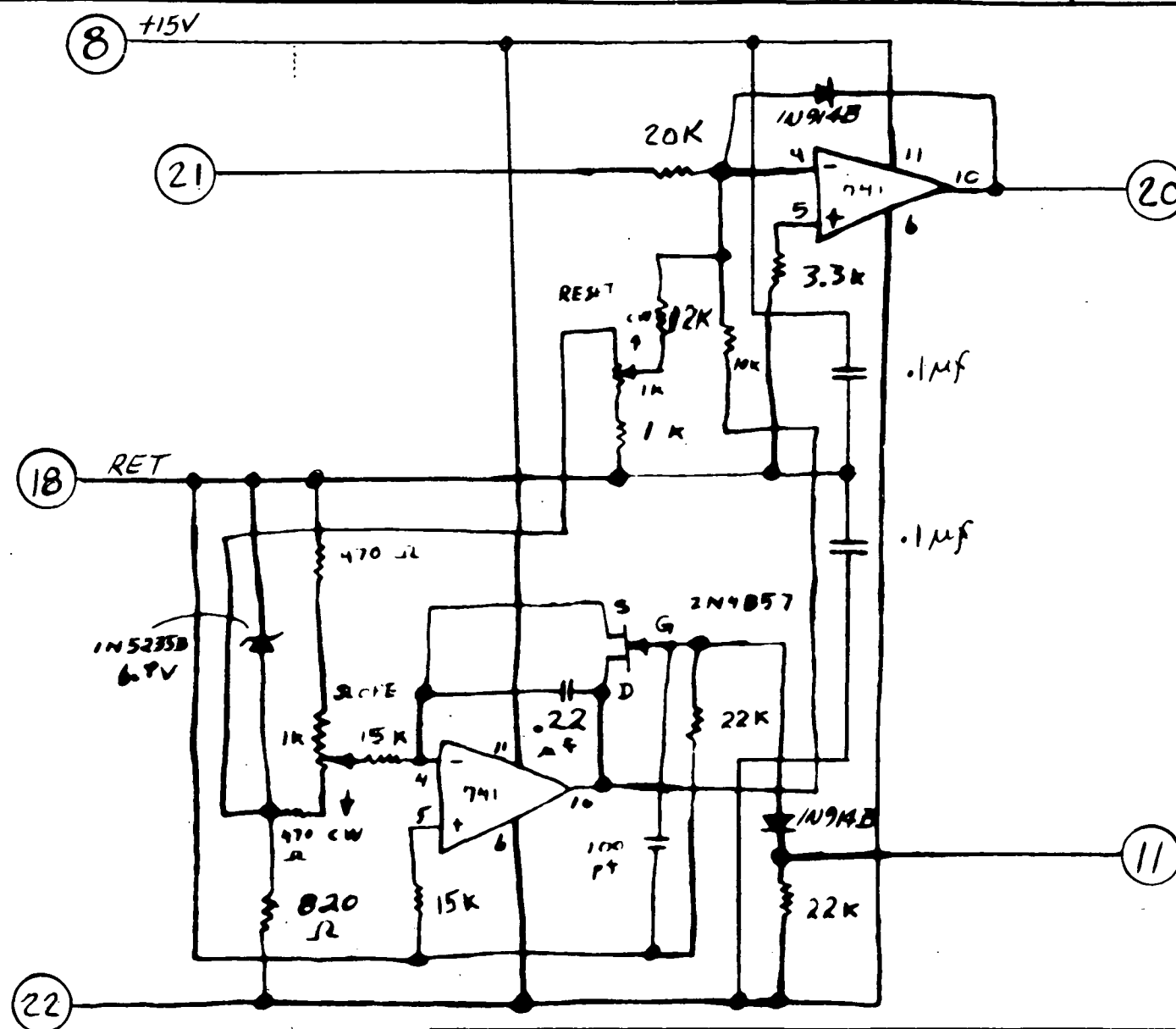
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PARTS LIST

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FOLDOUT FRAME 1

FOLDOUT FRAME 2

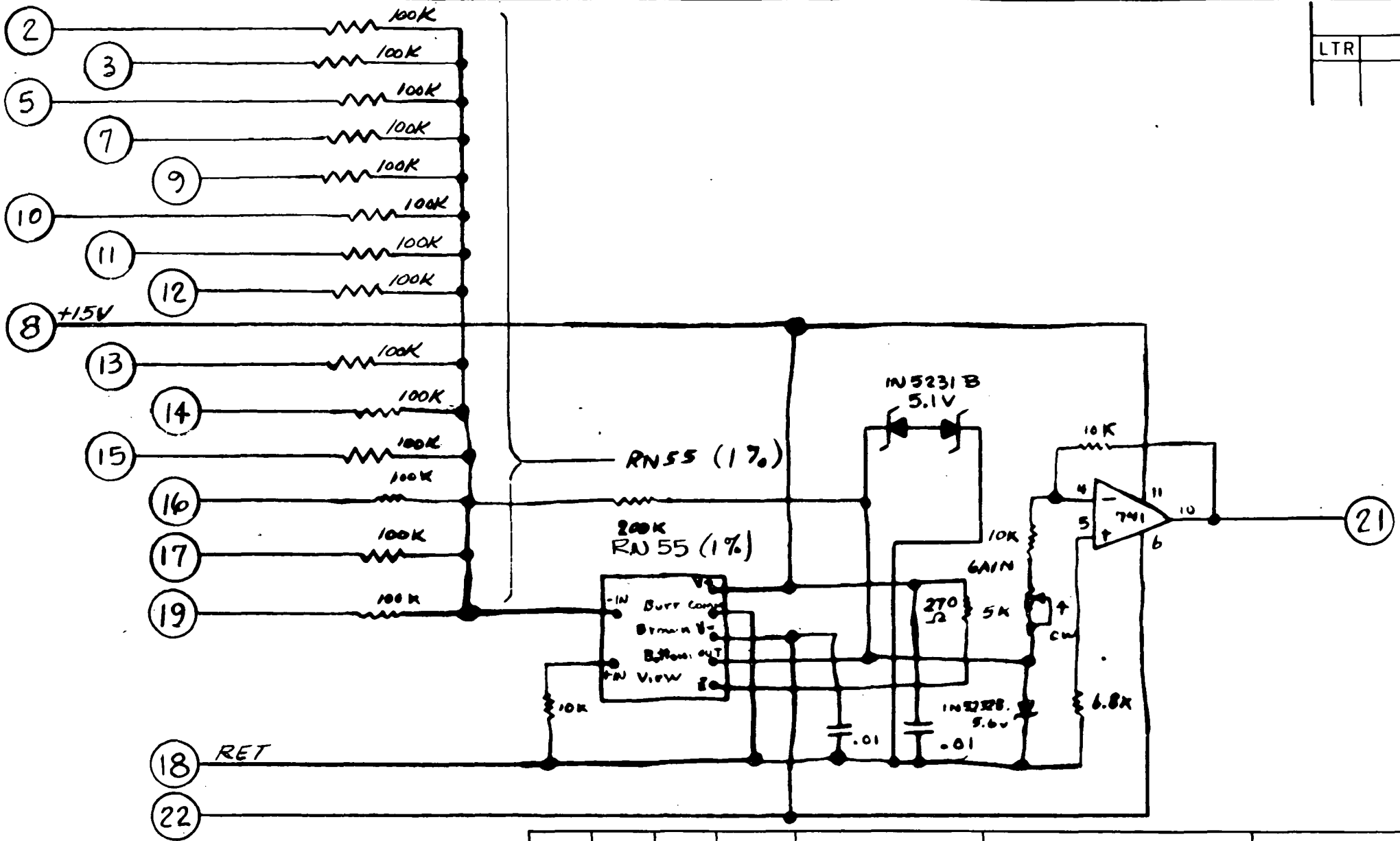


REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

		FIND NO.	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR NOTE	COMMERCIAL DESIGNATION	SPECIFICATION	DIA	THK	W	LG	TS 1000 PSI	UNIT WT

PARTS LIST

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REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

QTY REQD	FIND NO.	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION	MATERIAL OR NOTE	COMMERCIAL DESIGNATION	SPECIFICATION	DIA	THK	W	LG	TS 1000 PSI	UNIT WT
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PARTS LIST

EO NO.	SH OF SH	NUMBER	APPLICATION	DESIGN H. LATKA 4-26-71	BELL AEROSYSTEMS COMPANY
EO TO COMPLETE PRINT				APPD	POST OFFICE BOX ONE
HOLE TOLERANCES EXCEPT AS SHOWN				CHK	BUFFALO, NEW YORK 14240
.040 TO .129 +.005, -.000				STRESS	DIVISION OF BELL AEROSPACE CORPORATION—A TEXTRON COMPANY
.130 TO .250 +.006, -.000				WT	MANIPULATOR ENCODER
.251 TO .485 +.008, -.000				REL	BOARD A5
.486 TO .735 +.010, -.000				CONTR NO.	
.736 TO .985 +.012, -.000					SIZE CODE IDENT NO.
986 AND LARGER ±.010					B 80070 D8586-382064
					SCALE — SHEET

FOLDOUT FRAME 1

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FOLDOUT FRAME 2

