



CDC® MINI MODULE DRIVE

BZ5AX

BZ9AX

INSTALLATION AND CHECKOUT

MAINTENANCE

DIAGRAMS

WIRE LISTS

PARTS DATA

HARDWARE MAINTENANCE MANUAL

REVISION RECORD

REVISION	DESCRIPTION
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REVISION LETTERS I, O, Q
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REVISION RECORD (Contd)

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<p style="text-align: center;">H (3-18-80)</p>	<p>Manual revised to incorporate Series Code 17 changes, which includes ECOs 42238A, 49168, 50672, 50691A, 50721, 50734, 50743A, 50757, 50771, 50795, 50800, 50807, 50808A, 50809, 50814, 50824, 50835, 50838, 50843, 50848, 50853, 50860, 56604A, 58205.</p>
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<p style="text-align: center;">L (9-12-80)</p>	<p>Manual revised to incorporate Series Code 20 changes: ECO's 50897B, 50928, 50967A, 50973A, technical changes, and editorial changes.</p>
<p style="text-align: center;">M (11-4-80)</p>	<p>Manual revised to incorporate Series Code 21 changes: ECO's 62003, 62004, 62014, 62029, 62028, 62043, 62044, 62071, technical changes, and editorial changes.</p>
<p style="text-align: center;">N (2-12-81)</p>	<p>Manual revised to incorporate Series Code 22 changes: ECO's 62072, 62084, 62112, 62070, FCO's 62072, 62112, 62070, technical changes, and editorial changes. Also incorporated Series Code 23 change: ECO/FCO 62127. This edition obsoletes all previous editions.</p>
<p style="text-align: center;">P (3-10-81)</p>	<p>Manual revised to incorporate Series Code 23 changes: ECO's 62073, 62142, 49195, 49196, FCO's 62142, 62212, 62213, technical and editorial changes.</p>
<p style="text-align: center;">R (5-1-81)</p>	<p>Manual revised to incorporate the following Series Code 24 changes: ECO's 62140, 62182, 62199, 62224, 62225, technical changes, and editorial changes.</p>

REVISION RECORD (Contd)

REVISION	DESCRIPTION
S (7-23-81)	Manual revised to incorporate the following Series Code 25 changes: ECO's 62226, 62253, 62266, 62309, technical changes, and editorial changes. Also incorporated FCO 02015.
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AA (1-21-83)	Series Code 32 changes: ECO's 02323, 02379, 02380, 02394, FCO 02379, technical and editorial changes.
AB (5-6-83)	Series Code 33 changes: ECO's 02422, 02436, 02450, technical and editorial changes.
AC (6-27-83)	Series Code 34 and 35 changes: ECO's 02479, 02504, 02527, 02544, technical and editorial changes.

MANUAL TO EQUIPMENT LEVEL CORRELATION

This manual reflects the equipment configurations listed below.

EXPLANATION: Locate the equipment type and series code number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series code number is an FCO number. If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

This correlation sheet also applies to the following related manuals:

Publication No. 83323160 Rev. M

Publication No. _____ Rev. _____

EQUIPMENT TYPE	SERIES CODE	WITH FCOs	COMMENTS
BZ5XX/BZ9XX	09	None	
	10	None	
	11	None	
	12	50476	Incorporates new front panel.
	13	50534	Read Recovery.
		50535	Write Fault Volt Marg.
		50505	Incorporates microprocessor servo.
		50603	Incorporates twisted pair wires.
	14	50591	Random seek errors.
		50632	Eliminates data errors on FNRN.
	15	50659	Corrects Servo Seek error.
		16	None
	17	None	
	18	None	
	19	50967A	50967A applies to BZ5A1V/W, BZ5AG/H only

MANUAL TO EQUIPMENT LEVEL CORRELATION (Contd)

EQUIPMENT TYPE	SERIES CODE	WITH FCOs	COMMENTS
BZ5XX/BZ9XX	20	62072	FCO 62072 applies to BZ9A1J/K only
	21	62112	FCO 62112 applies to 80 MB units only
		62070	FCO 62070 applies to BZ5A1V/W, BZ5A5G/H only.
		62212	FCO 62212 applies to 80 MB units only.
		62213	FCO 62213 applies to 160 MB units only.
	22	62127	
		62142	FCO 62142 applies to 160 MB units only.
		02015	FCO 02015 applies to BZ5A1E/F/V/W/Z, BZ5A5G/H, BZ9A1C/W only.
	23	02099	FCO 02099 applies to BZ9A1J/K only.
	24	None	
	25	02028	FCO 02028 applies to BZ9A1J/K Series Codes 23/24 only.
		02042	FCO 02042 applies to BZ5A1B only.
	26	02141	Applies to BZ9A7A/B only.
	27	None	
28	None		
29	02240	FCO 02240 applies to BZ5A2E/F, BZ5A6C/D only	
30	02354	Applies to BZ5A2E/F, BZ5A6C/D only.	
31	02379	FCO 02379 applies to BZ5A3A/B, BZ5A5A/B/G/H/J, BZ5A6C/D, BZ9A3A, BZ9A5A/B	
32	None		
33	None		
34	None		

LIST OF EFFECTIVE PAGES

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New features, as well as changes, deletions, and additions to information in this manual are indicated by bars in the margins or by a dot near the page number if the entire page is affected. A bar by the page number indicates pagination rather than content has changed.

<u>PAGE</u>	<u>REV</u>	<u>PAGE</u>	<u>REV</u>
Cover	-	xxxiii	AB
Blank	-	xxxiv	AB
Title P	-	xxxv	AB
ii	AB	xxxvi	AB
iii	R	S-1 Div	-
iv	AC	Blank	-
v	Z	1-1	N
vi	AC	1-2	N
vii	AC	1-3	W
viii	AC	1-4	N
ix	AC	1-5	N
x	AC	1-6	W
xi	AC	1-7	N
xii	AC	1-8	R
xiii	AC	1-9	S
Blank	-	1-10	S
xv	AB	1-11	AB
xvi	AB	1-12	AB
xvii	AB	1-13	AB
xviii	AB	1-14	N
xix	AB	1-14.1	AB
xx	AB	1-14.2	AB
xxi	AB	1-15	AC
xxii	AB	1-16	AB
xxiii	AB	1-17	AC
xxiv	AB	1-18	R
xxv	AB	1-19	N
xxvi	AB	1-20	N
xxvii	AB	1-21	N
xxviii	AB	1-22	N
xxix	AB	1-23	N
xxx	AC	1-24	N
xxxi	AB	1-25	N
xxxii	AB	1-26	N

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1-29	Y	2-18	S
1-30	N	2-18.1	S
1-31	N	2-19	S
1-32	N	2-20	S
1-33	T	Blank	-
1-34	Y	S-2C Div	-
1-35	N	Blank	-
1-36	N	2-21	N
1-37	N	2-22	N
1-38	N	2-23	AB
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1-41	N	2-26	Y
1-42	T	2-27	N
1-43	T	2-28	N
1-44	N	2-29	N
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Blank	-	2-33	N
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2-3	W	2-38	N
2-4	AA	2-39	N
2-5	W	2-40	N
2-6	W	2-41	N
2-7	W	2-42	N
2-8	W	2-43	N
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2-12	AB	2-47	Y
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2-55	N	2-94	AB
2-56	N	2-95	AB
2-57	N	2-96	AB
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2-59	N	2-98	AB
2-60	N	2-99	AB
2-61	N	2-100	AB
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S-2D Div	-	Blank	-
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2-66	N	3-3	W
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2-75	AB	Blank	-
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3-30	N	3-62.5	U
3-31	N	3-62.6	Z
3-32	N	3-62.7	AC
3-32.1	Z	3-62.8	Z
3-32.2	Z	3-62.9	AC
3-32.3	Z	3-62.10	Z
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3-33	AA	3-62.12	Z
3-34	N	3-63	Z
3-35	AA	3-64	Z
3-36	N	3-65	Z
3-37	N	3-66	N
Blank	-	3-67	N
3-39	AC	3-68	Z
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3-41	AC	Blank	-
3-42	AC	3-71	AB
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3-49	Z	Blank	-
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3-117	N	3-140	Z
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3-120	N	3-140.3	Z
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3-126.5	R	3-142	N
3-126.6	R	3-143	N
3-126.7	AB	Blank	-
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3-126.13	AB	3-150	N
3-126.14	AB	3-151	U
3-126.15	AB	3-152	N
3-126.16	AB	3-153	U
3-126.17	AB	3-154	N
3-126.18	AB	3-155	S
3-127	Z	3-156	N
3-128	Z	3-157	W
3-129	Z	3-158	N
3-130	S	3-159	W
3-131	S	3-160	N
3-132	S	3-161	AA
3-133	Z	3-162	AA
Blank	-	3-163	T
3-135	Z	3-164	AA
3-136	Z	3-165	N
3-137	Z	Blank	-
3-138	S	3-167	AC
3-139	S	3-168	N

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3-170	N	4-3	N
3-170.1	AC	4-4	AA
3-170.2	AC	4-5	AA
3-170.3	AC	4-6	N
3-171	AC	4-7	AA
3-172	N	4-8	N
3-173	R	4-9	AA
3-174	R	4-10	N
3-174.1	AC	4-11	N
3-174.2	AC	Blank	-
3-174.3	AC	S-5 Div	-
3-174.4	AC	Blank	-
3-175	N	5-1	P
3-176	N	Blank	-
3-177	N	S-5A Div	-
3-178	N	Blank	-
3-179	N	5-3	H
3-180	N	Blank	-
3-181	N	5-5	J
3-182	N	5-6	AC
3-183	N	5-7	AC
3-184	N	5-8	AC
3-185	N	5-9	AC
3-186	N	5-10	AB
3-187	N	5-11	AC
3-188	N	5-12	AC
3-189	N	5-13	W
3-190	N	Blank	-
3-191	N	5-15	AC
3-192	N	5-16	V
3-193	N	5-17	W
3-194	N	5-18	AB
3-195	N	5-19	AB
3-196	N	5-20	AB
3-197	N	5-21	V
3-198	N	5-22	T
S-4 Div	-	5-23	Y
Blank	-	5-24	AB
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		5-26	AB

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5-26.2	AB	5-42	M
5-26.3	AB	5-43	Z
5-26.4	AB	5-44	Z
5-27	AB	5-45	AC
5-28	V	5-46	Z
5-29	Z	5-47	AC
Blank	-	5-48	AC
5-31	V	5-49	AB
5-32	AB	5-50	Z
5-32.1	AB	5-51	AC
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5-33	AB	5-53	AC
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5-35	AA	5-55	AC
Blank	-	5-56	AC
5-37	AB	5-57	AB
5-38	V	5-58	AB
5-39	V	Cmt Sht	-
5-40	AC	Rtn Env	-
S-5B Div	-	Blank	-
Blank	-	Cover	-

WARNING

To ensure the integrity of safety features built into these drives, installation and maintenance must be performed only by qualified service personnel using designated CDC/MPI parts. Also, in case of fire or other emergency, isolate the drives from main power by disconnecting the drive power plugs from their site power receptacles. In situations where pulling the plugs is not possible or practical (such as in a rack mount installation), use the system main power disconnect to isolate the drives from main power.

WARNUNG

Um das einwandfreie Funktionieren der eingebauten Schutzvorrichtungen zu gewährleisten, darf die Installation und Wartung nur von qualifiziertem Service-Personal unter Verwendung von Original CDC/MPI Teilen durchgeführt werden. Beim Ausbrechen von Feuer oder in anderen Notfällen ist die Verbindung zum Hauptstromnetz dadurch zu unterbrechen, dass die Stecker der Antriebe aus den Steckdosen gezogen werden. Sollte dies nicht möglich oder unpraktisch sein (z. B. dann, wenn die Stationen übereinander installiert sind), ist der Hauptstromunterbrecher des Systems zu bedienen, um die Antriebe vom Hauptstromnetz zu trennen.

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CONFIGURATION CHART

Equip No. (BZ)	Part Number	Power Volts/Hz/W	Data Cap. (MB)	Dual Ch	Fxd Hds	Long Last Sctr	Crg Ofs	Part No. for Painted Parts	
								Color Panel	Control Panel
5A1A	73036702	120/60/480	80	No	No	No	No	73036412	82395902
5A1B	73036703	220/50/420	80	No	No	No	No	73036412	82395902
5A1C	73036726	120/60/480	80	No	No	No	No	73036419	82395920
5A1D	73036727	220/50/420	80	No	No	No	No	73036419	82395920
5A1E	73036747	120/60/480	80	No	No	No	No	73036412	73043800
5A1F	73036728	240/50/420	80	No	No	No	No	73036417	82395918
5A1G	73036761	120/60/480	80	No	No	No	No	73036412	73062401
5A1H	73036729	120/60/480	80	No	No	No	No	73036412	82395902
5A1J*	73036730	120/60/480	80	No	No	No	No	73036424	82395923
5A1K*	73036731	220/50/420	80	No	No	No	No	73036424	82395923
5A1L	82397707	240/60/460	80	No	No	No	Mo	73036404	82395902
5A1R*	73036748	120/60/480	80	No	No	No	No	73036424	82395923
5A1S*	73036749	220/50/420	80	No	No	No	No	73036424	82395923
5A1T	73036762	120/60/480	80	No	No	No	No	73036412	73062401
5A1U	73036763	220/50/420	80	No	No	No	No	73036412	73062401
5A1V	73036764	120/60/480	80	No	No	No	Yes	73036433	82395933
5A1W	73036765	220/50/420	80	No	No	No	Yes	73036433	82395933
5A1Z	73036777	220/50/420	80	No	No	No	No	73036415	82395916
5A2A	73036708	120/60/480	80	Yes	No	No	No	73036412	82395902
5A2B	73036709	220/50/420	80	Yes	No	No	No	73036412	82395902
5A2C*	73036732	120/60/480	80	Yes	No	No	No	73036424	82395923
5A2D*	73036733	220/50/420	80	Yes	No	No	No	73036424	82395923
5A2E*	73036736	120/60/480	80	Yes	No	No	No	47365522	82395001
5A2F*	73036737	220/50/420	80	Yes	No	No	No	47365522	82395001
5A2G*	73036750	120/60/480	80	Yes	No	No	No	73036424	82395923
5A2H*	73036751	220/50/420	80	Yes	No	No	No	73036424	82395923
5A2J	73036787	120/60/480	80	Yes	No	No	No	73036412	82395902
5A3A	73036704	120/60/480	80	No	48	No	No	73036412	82395902
5A3B	73036705	220/50/420	80	No	48	No	No	73036412	82395902
5A4A	73036710	120/60/480	80	Yes	48	No	No	73036412	82395902
5A4B	73036711	220/50/420	80	Yes	48	No	No	73036412	82395902

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CONFIGURATION CHART (Contd)

Equip No. (BZ)	Part Number	Power Volts/Hz/W	Data Cap (MB)	Dual Ch	Fxd Hds	Long Last Sctr	Crg Ofs	Part No. for Painted Parts	
								Color Panel	Control Panel
5A5A	73036706	120/60/480	80	No	96	No	No	73036412	82395902
5A5B	73036707	220/50/420	80	No	96	No	No	73036412	82395902
5A5D	73036794	120/60/480	80	No	96	No	No	73036404	82395933
5A5F	73036795	120/60/480	80	No	96	No	No	73036407	82395907
5A5G	73036775	120/60/480	80	No	96	No	Yes	73036433	82395933
5A5H	73036776	220/50/420	80	No	96	No	Yes	73036433	82395933
5A5J	73036788	120/60/480	80	No	96	No	No	73036404	82395933
5A5K	73036796	120/60/480	80	No	96	No	No	73036404	82395933
5A5L	73036797	120/60/480	80	No	96	No	No	73036407	82395907
5A6A	73036712	120/60/480	80	Yes	96	No	No	73036412	82395902
5A6B	73036713	220/50/420	80	Yes	96	No	No	73036412	82395902
5A6C*	73036734	120/60/480	80	Yes	96	No	No	47365522	82395001
5A6D*	73036735	220/50/420	80	Yes	96	No	No	47365522	82395001
5A9B	73036778	220/50/420	80	No	No	No	No	73036436	82395935
5A9C	73036781	120/60/480	80	No	No	No	No	73036411	82395944
5A9D	73036782	220/50/420	80	No	No	No	No	73036411	82395944
5A9E	73036779	120/60/480	80	No	96	No	No	73036412	82395902
5A9F	73036780	220/50/480	80	No	96	No	No	73036412	82395902
5A9G	73036783	120/60/480	80	No	No	No	No	73036439	82395919
5A9H	73036784	220/50/420	80	No	No	No	No	73036439	82395919
5A9J	73036785	120/60/480	80	No	No	No	No	73036412	82395902
5A9K	73036786	220/50/420	80	No	No	No	No	73036412	82395902
5A9L*	73036789	120/60/480	80	No	No	No	No	Not used	73083700
5A9M*	73036790	220/50/420	80	No	No	No	No	Not used	73083700
5A9N*	73036798	120/60/480	80	No	No	No	No	73036412	82395902
5A9P*	73036799	220/50/420	80	No	No	No	No	73036412	82395902
5A9R	82399702	120/60/480	80	No	No	No	No	73036404	82395902
9A1A	73036802	120/60/480	160	No	No	No	No	73036412	82395902
9A1B	73036803	220/50/420	160	No	No	No	No	73036412	82395902
9A1C	73036845	120/60/480	160	No	No	No	No	73036412	82395902
9A1E	73036853	120/60/480	160	No	No	No	No	73036412	82395902
9A1F	73036854	220/50/420	160	No	No	No	No	73036412	82395902
9A1G	73036855	120/60/480	160	No	No	No	No	73036446	82395945
9A1H	73036856	220/50/420	160	No	No	No	No	73036446	82395945
9A1J	73036867	120/60/480	160	No	No	Yes	No	73036437	82395949
9A1K	73036868	220/50/420	160	No	No	Yes	No	73036437	82395949
9A1L	73036869	120/60/480	160	No	48	Yes	No	73036437	82395949

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CONFIGURATION CHART (Contd)

Equip No. (BZ)	Part Number	Power Volts/Hz/W	Data Cap (MB)	Dual Ch	Fxd Hds	Long Last Sctr	Crg Ofs	Part No. for Painted Parts	
								Color Panel	Control Panel
9A1M	73036870	220/50/420	160	No	48	Yes	No	73036437	82395949
9A1N	73036873	120/60/480	160	No	No	No	No	73036412	82395902
9A1P	73036874	120/60/480	160	No	No	No	No	73036411	82395944
9A1R	73036875	220/50/420	160	No	No	No	No	73036411	82395944
9A1S	73036876	120/60/480	160	No	No	No	No	73036443	82395942
9A1T	73036877	220/50/420	160	No	No	No	No	73036443	82395942
9A1U	73036878	120/60/480	160	No	No	No	No	73036446	82395945
9A1V	73036879	220/50/420	160	No	No	No	No	73036446	82395945
9A1W	73036886	240/50/420	160	No	No	No	No		82395918
9A1Y	73036893	120/60/480	160	No	No	No	No	73036412	82395902
9A1Z	73036887	220/50/420	160	No	No	No	No	73036412	82395902
9A2A	73036808	120/60/480	160	Yes	No	No	No	47365522	82395902
9A2B	73036809	220/50/420	160	Yes	No	No	No	47365522	82395902
9A2C*	73036882	120/60/480	160	Yes	No	No	No	73036422	82395001
9A2D*	73036883	220/50/420	160	Yes	No	No	No	73036422	82395001
9A3A	73036804	120/60/480	160	No	48	No	No	73036412	82395902
9A3B	73036805	220/50/420	160	No	48	No	No	73036412	82395902
9A4A	73036810	120/60/480	160	Yes	48	No	No	73036412	82395902
9A4B	73036811	220/50/420	160	Yes	48	No	No	73036412	82395902
9A5A	73036806	120/60/480	160	No	96	No	No	73036412	82395902
9A5B	73036807	220/50/420	160	No	96	No	No	73036412	82395902
9A5C	73036865	120/60/480	160	No	96	No	No	73036446	82395945
9A5D	73036866	220/50/420	160	No	96	No	No	73036446	82395945
9A5E	73036871	120/60/480	160	No	96	Yes	No	73036437	82395949
9A5F	73036872	220/50/420	160	No	96	Yes	No	73036437	82395949
9A5G	73036880	120/60/480	160	No	96	No	No	73036441	82395940
9A5H	73036881	220/50/420	160	No	96	No	No	73036441	82395940
9A6A	73036812	120/60/480	160	Yes	96	No	No	73036412	82395902
9A6B	73036813	220/50/420	160	Yes	96	No	No	73036412	82395902
9A6C*	73036884	120/60/480	160	Yes	96	No	No	47365522	82395001
9A6D*	73036885	220/50/420	160	Yes	96	No	No	47365522	82395001
9A6E*	82399808	120/60/480	160	Yes	96	No	No	73036422	82395910
9A6F*	82399809	220/50/420	160	Yes	96	No	No	73036422	82395910
9A7A*	73036888	120/60/480	160	No	No	No	No	Not used	73083700
9A7B*	73036889	220/50/420	160	No	No	No	No	Not used	73083700
9A7C	73036894	120/60/480	160	No	No	No	No	73036439	82395919
9A7D	73036895	220/50/420	160	No	No	No	No	73036439	82395919
9A7E	73036896	120/60/480	160	No	No	No	No	73036402	82395904
9A7F	73036897	220/50/420	160	No	No	No	No	73036402	82395904
9A7G	73036898	240/50/420	160	No	No	No	No	73036412	82395902
9A7L	82399806	240/60/460	160	No	No	No	No	73036404	82395902
9A7M	82399807	220/50/420	160	No	No	No	No	73036436	82395935

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CONFIGURATION CHART (Contd)

Equip No. (BZ)	Part Number	Power	Data	Dual	Fxd	Long	Crg	Part No. for	
		Volts/Hz/W	Cap (MB)	Ch	Hds	Last Sctr	Ofs	Painted Parts	Control
								Color Panel	Panel
5W1H*	82399712	240/50/420	80	No	No	No	No	Not used	73062401
511A	82399716	120/60/480	80	No	No	No	No	Not used	73083700
511B	82399717	220/50/420	80	No	No	No	No	Not used	73083700
9A1A	73036802	120/60/480	160	No	No	No	No	73036412	82395902
9A1B	73036803	220/50/420	160	No	No	No	No	73036412	82395902
9A1C	73036845	120/60/480	160	No	No	No	No	73036412	73043800
9A1E	73036853	120/60/480	160	No	No	No	No	73036412	73062401
9A1F	73036854	220/50/420	160	No	No	No	No	73036412	73062401
9A1G	73036855	120/60/480	160	No	No	No	No	73036446	82395945
9A1H	73036856	220/50/420	160	No	No	No	No	73036446	82395945
9A1J	73036867	120/60/480	160	No	No	Yes	No	73036437	82395949
9A1K	73036868	220/50/420	160	No	No	Yes	No	73036437	82395949
9A1L	73036869	120/60/480	160	No	48	Yes	No	73036437	82395949
9A1M	73036870	220/50/420	160	No	48	Yes	No	73036437	82395949
9A1N	73036873	120/60/480	160	No	No	No	No	Not used	73062401
9A1P	73036874	120/60/480	160	No	No	No	No	73036411	82395944
9A1R	73036875	220/50/420	160	No	No	No	No	73036411	82395944
9A1S	73036876	120/60/480	160	No	No	No	No	73036443	82395942
9A1T	73036877	220/50/420	160	No	No	No	No	73036443	82395942
9A1U	73036878	120/60/480	160	No	No	No	No	73036446	82395945
9A1V	73036879	220/50/420	160	No	No	No	No	73036446	82395945
9A1W	73036886	240/50/420	160	No	No	No	No	73036417	82395918
9A1Y	73036893	120/60/480	160	No	No	No	No	73036412	82395902
9A1Z	73036887	220/50/420	160	No	No	No	No	73036412	82395902
9A2A	73036808	120/60/480	160	Yes	No	No	No	47365522	82395902
9A2B	73036809	220/50/420	160	Yes	No	No	No	47365522	82395902
9A2C*	73036882	120/60/480	160	Yes	No	No	No	73036422	82395001
9A2D*	73036883	220/50/420	160	Yes	No	No	No	73036422	82395001
9A3A	73036804	120/60/480	160	No	48	No	No	73036412	82395902
9A3B	73036805	220/50/420	160	No	48	No	No	73036412	82395902
9A4A	73036810	120/60/480	160	Yes	48	No	No	73036412	82395902
9A4B	73036811	220/50/420	160	Yes	48	No	No	73036412	82395902
9A5A	73036806	120/60/480	160	No	96	No	No	73036412	82395902
9A5B	73036807	220/50/420	160	No	96	No	No	73036412	82395902
9A5C	73036865	120/60/480	160	No	96	No	No	73036446	82395945
9A5D	73036866	220/50/420	160	No	96	No	No	73036446	82395945
9A5E	73036871	120/60/480	160	No	96	Yes	No	73036437	82395949
9A5F	73036872	220/50/420	160	No	96	Yes	No	73036437	82395949
9A5G	73036880	120/60/480	160	No	96	No	No	73036441	82395940
9A5H	73036881	220/50/420	160	No	96	No	No	73036441	82395940

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CONFIGURATION CHART (Contd)

Equip No. (BZ)	Part Number	Power	Data	Dual	Fxd	Long	Crg	Part No. for Painted Parts	
		Volts/Hz/W	Cap (MB)	Ch	Hds	Last Sctr	Ofs	Color Panel	Control Panel
9A6A	73036812	120/60/480	160	Yes	96	No	No	73036412	82395902
9A6B	73036813	220/50/420	160	Yes	96	No	No	73036412	82395902
9A6C*	73036884	120/60/480	160	Yes	96	No	No	47365522	82395001
9A6D*	73036885	220/50/420	160	Yes	96	No	No	47365522	82395001
9A6E*	82399808	120/60/480	160	Yes	96	No	No	73036422	82395910
9A6F*	82399809	220/50/420	160	Yes	96	No	No	73036422	82395910
9A7A*	73036888	120/60/480	160	No	No	No	No	Not used	73083700
9A7B*	73036889	220/50/420	160	No	No	No	No	Not used	73083700
9A7C	73036894	120/60/480	160	No	No	No	No	47365539	82395919
9A7D	73036895	220/50/420	160	No	No	No	No	47365539	82395919
9A7E	73036896	120/60/480	160	No	No	No	No	73036402	82395904
9A7F	73036897	220/50/420	160	No	No	No	No	73036402	82395904
9A7G	73036898	240/50/420	160	No	No	No	No	73036412	82395902
9A7L	82399806	240/60/460	160	No	No	No	No	73036404	82395902
9A7M	82399807	220/50/420	160	No	No	No	No	73036436	82395935
9A7N	82399810	220/50/420	160	No	No	No	No	73036403	82395909
9A7P	82399811	120/60/480	160	No	No	No	No	47365505	82395914
9A7R	82399812	220/50/420	160	No	No	No	No	47365505	82395914
9A7S	82399813	120/60/480	160	No	No	No	No	73036405	82395922
9A7T	82399814	120/60/480	160	No	No	No	No	Not used	73062401
9A7U	82399815	240/50/420	160	No	No	No	No	Not used	73062401
9A7V	82399816	220/50/420	160	No	No	No	No	Not used	73043800
9A7W	82399819	120/60/480	160	No	No	No	No	73036409	82395902
9A7Y	82399820	220/50/420	160	No	No	No	No	73036409	82395902
9A9A	82399823	120/60/480	160	No	No	No	No	73036412	82395917
9A9B	82399824	240/50/420	160	No	No	No	No	73036412	82395917
9A9C	82399830	120/60/480	160	No	No	No	No	73036420	82395924
9A9D	82399829	120/50/420	160	No	No	No	No	73036420	82395924
9A9E	82399831	120/60/480	160	No	No	No	No	73036421	82395944
9A9F	82399832	220/50/420	160	No	No	No	No	73036421	82395944
9A9G	82399833	120/60/480	160	No	No	No	No	73036423	82395925
9A9H	82399834	220/50/420	160	No	No	No	No	73036423	82395925
911A*	82399817	120/60/480	160	No	No	No	No	Not used	73083700
911B*	82399818	220/50/420	160	No	No	No	No	Not used	73083700

* Special Supplement manual used in conjunction with this manual.
Refer to Preface for publication number.

ABBREVIATIONS (Contd)

HEX	Hexagon	LSD	Least Significant Digit
Hg	Mercury		
Hz	Hertz	LSI	Large Scale Integration
IC	Integrated Circuit	LZ	Landing Zone
ID	Identification	m	Meter
IDENT	Identification	MACH	Machine
IDX	Index	MAG	Magnitude
in	Inch	MAINT	Maintenance
INT	Internal	MAX	Maximum
INTEG	Integrator	MB	Megabyte
I/O	Input/Output	MC	Master Clear
IPB	Illustrated Parts Breakdown	MET	Metal
IRQ	Interrupt Request	MFM	Modified Frequency Modulation
kg	Kilogram	MH	Moveable Head
kHz	Kilohertz	MHz	Megahertz
kPa	Kilopascal	MIN	Minimum
kW	Kilowatt	MK	Mark
k Ω	Kilohm	mm	Millimeter
lb	Pound	MMD	Mini Module Drive
lbf	Pound-Force	MOD	Module
LD	Level Detect	MOV	Movable
LED	Light Emitting Diode	MPI	Magnetic Peripherals, Inc.
LOC	Local, Location		

ABBREVIATIONS (Contd)

MPU	Microprocessor Unit	PC	Printed Circuit
ms	Millisecond	PHH	Phillips Head
MSD	Most Significant Digit	PIA	Peripheral Interface Adapter
MTR	Motor	PLO	Phase Lock Oscillator
MULT	Multiple	PN	Part Number
MUX	Multiplexer	PNH	Pan Head
N	Newton	POS	Positive
NC	No Connection, Normally Closed	POSN	Position
NEG	Negative	PP	Peak-To-Peak
NFR	Not Field Replaceable	PREAMP	Preamplifier
NMI	Non Maskable Interrupt	PTM	Programmable Timing Module
NO	Number, Normally Open	PVA	Peak Variation
NOM	Nominal	PWR	Power
NORM	Normal	RAM	Random Access Memory
NRM	Normal	RCVR	Receiver
NRZ	Non Return To Zero	RD	Read
ns	Nanosecond	RDY	Ready
Nsec	Nanosecond	RECAL	Recalibrate
OFS	Offset	RECT	Rectified
OGB	Outer Guard Band	REF	Reference
ORN	Orange	REG	Regulator, Regulated
OS	One Shot	REM	Remote
OSC	Oscillator		

ABBREVIATIONS (Contd)

RES	Reserved, Resolution	SLFTPG	Self Tapping
RET	Retract	SW	Switch
REV	Reverse, Revision	TERM	Terminator
RFI	Radio Frequency Interference	TF	Thread Forming
RGTR	Register	TLA	Top Level Assembly
RH	Relative Humidity	TP	Test Point
r/min	Revolutions Per Minute	TRANS	Transition
ROM	Read Only Memory	TRK	Track
RPM	Revolutions Per Minute	TTL	Transistor-Transistor Logic
RPS	Rotational Position Sensing	V	Volts, Voltage
RTM	Reserve Timeout	V ac	Volts Alternating Current
RTZ	Return to Zero	VCO	Voltage Controlled Oscillator
R/W	Read/Write	VEL	Velocity
s	Second, Single	VFL	Velocity Follow Latch
S/C	Series Code	VIO	Violet
SCH	Socket Head	VMA	Valid Memory Address
SCTR	Sector	VOM	Voltohmeter
SEC	Second	W	Watts, Write
SEL	Select	W/	With
SEQ	Sequence	WHT	White
SH	Sheet	W/O	Without
SHLDR	Shoulder	W PROT	Write Protect

ABBREVIATIONS (Contd)

W+R	Write or Read
W·R	Write and Read
WRT	Write
W/W	Wirewrap
XDUCER	Transducer
XMTR	Transmitter
XTAL	Crystal
YEL	Yellow
μ	Micro
μF	Microfarad
μH	Microhenry
μP	Microprocessor
μS	Microsecond
±XXXX	Hexadecimal Number
\$XXXX	Hexadecimal Address

SECTION 1

INSTALLATION AND CHECKOUT

INTRODUCTION

The information contained in this section describes installation and initial checkout of the MMD.

SITE REQUIREMENTS

GENERAL

The site requirements considered are environment, space, power, grounding, and interface.

ENVIRONMENTAL REQUIREMENTS

There are no special environmental requirements for the MMD beyond those listed in the reference manual.

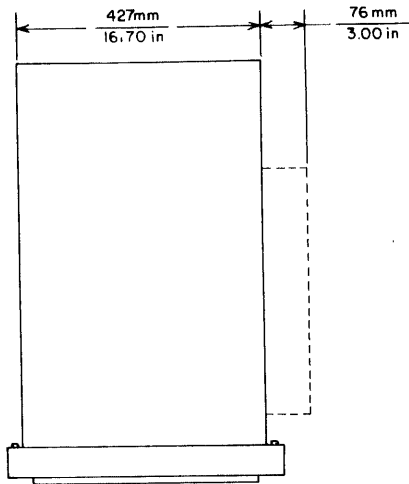
SPACE REQUIREMENTS

The MMD slide mounts into a 483 mm (19 in) standard rack. The slide action allows a complete outward extension of the unit for ease of maintenance. The space requirements are shown in figure 1-1.

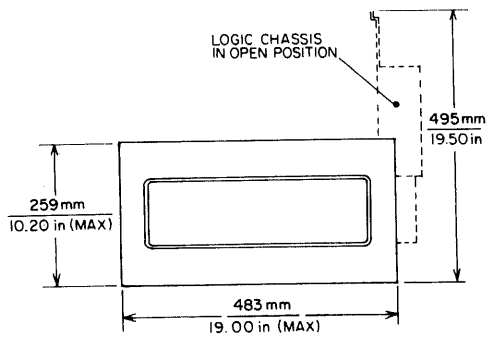
The mass of the drive is 45.4 kg (100 lbs). In the extended position, the drive center of gravity is approximately 300 mm (12 in) from the rack front.

POWER REQUIREMENTS

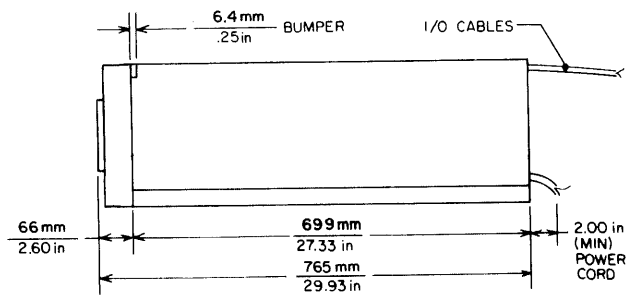
Drive ac power requirements are listed in table 1-1. Conversion to the different line voltages is explained in the Transformer Wiring paragraphs. Drive current versus start-up time is shown in figure 1-2 for 120, 220, and 240 volt connections.



TOP VIEW



FRONT VIEW



SIDE VIEW

9P215C

Figure 1-1. MMD Space Requirements

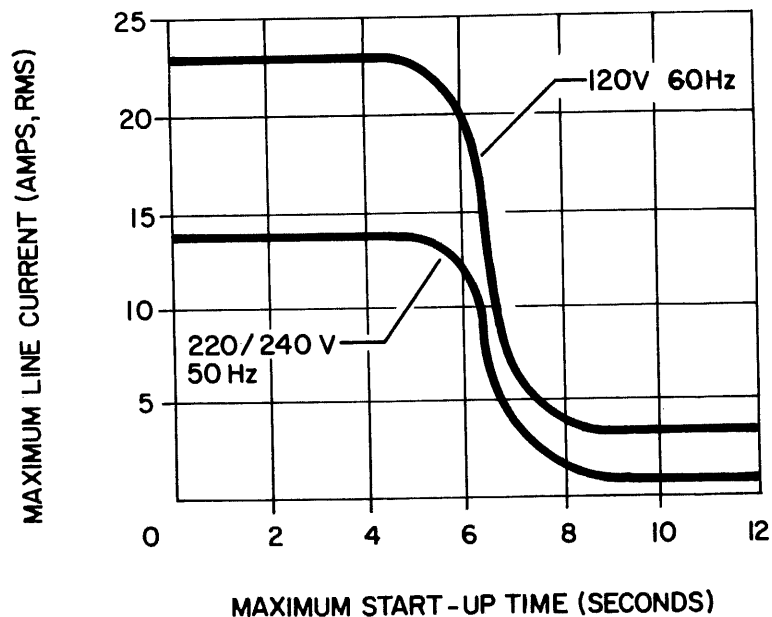
TABLE 1-1. POWER REQUIREMENTS

Specifications	Value			
AC Power Input Options	<u>Voltage</u>	<u>Frequency</u>	<u>Phase</u>	
	120 (+8, -18) V	60 (+.6, -1) Hz	1	
	220 (+15, -25) V	50 (+.5, -1) Hz	1	
240 (+17, -27) V	50 (+.5, -1) Hz	1		
Power Used with Disks and Carriage in Motion	<u>Power Input</u>	<u>Max Line Current</u>	<u>Power Consumption</u>	<u>Power Factor</u>
	120 V, 60 Hz	5.2 A	0.52 kW	0.83
	220 V, 50 Hz	2.7 A	0.49 kW	0.75
240 V, 50 Hz	2.7 A	0.49 kW	0.75	
Power used with Disks and Carriage at Rest	<u>Power Input</u>	<u>Max Line Current</u>	<u>Power Consumption</u>	<u>Power Factor</u>
	120 V, 60 Hz	1.41 A	0.15 kW	0.9
	220 V, 50 Hz	0.67 A	0.18 kW	0.9
240 V, 50 Hz	0.67 A	0.18 kW	0.9	
Start Up Current	Refer to figure 1-2.			

GROUNDING REQUIREMENTS

General

Safety grounding, connecting the drive power cord to a grounded outlet, and system grounding, connecting the controller and drives to earth ground, are discussed in the following paragraphs.



9T254

Figure 1-2. Line Current Versus Start-Up Time

Safety Grounding

A safety ground must be provided by the site ac power system. The green (or green and yellow striped) wire in the drive's power cord provides the safety ground connection between the drive and the power system. In turn, the site ac power system must tie this connection (safety ground) to earth ground. All site ac power connection points, including convenience outlets for test equipment, must be maintained at the same safety ground potential.

System Grounding

In addition to safety grounding, a system ground connection is also required. The following paragraphs describe various grounding configurations and suggest the correct choice for a particular site. The Installation Procedures in this section have separate grounding instructions for each configuration. Detailed schematic diagrams of the grounding configurations are provided with these procedures. It is necessary to select the best configuration before beginning to ground the system.

The following discussion relates to site features and site planning. The three grounding choices are presented in the order of effectiveness.

If the site has a floor grid, it should be used. A typical floor grid is shown in figure 1-3. It consists of a mechanical structure which supports a false floor. The elements of the grid are connected electrically to ensure that the entire grid is at ground potential. The controller and MMDs are grounded to the floor grid, and the floor grid must be connected to earth ground. If the floor grid is not grounded, connect the controller to both the grid and earth ground.

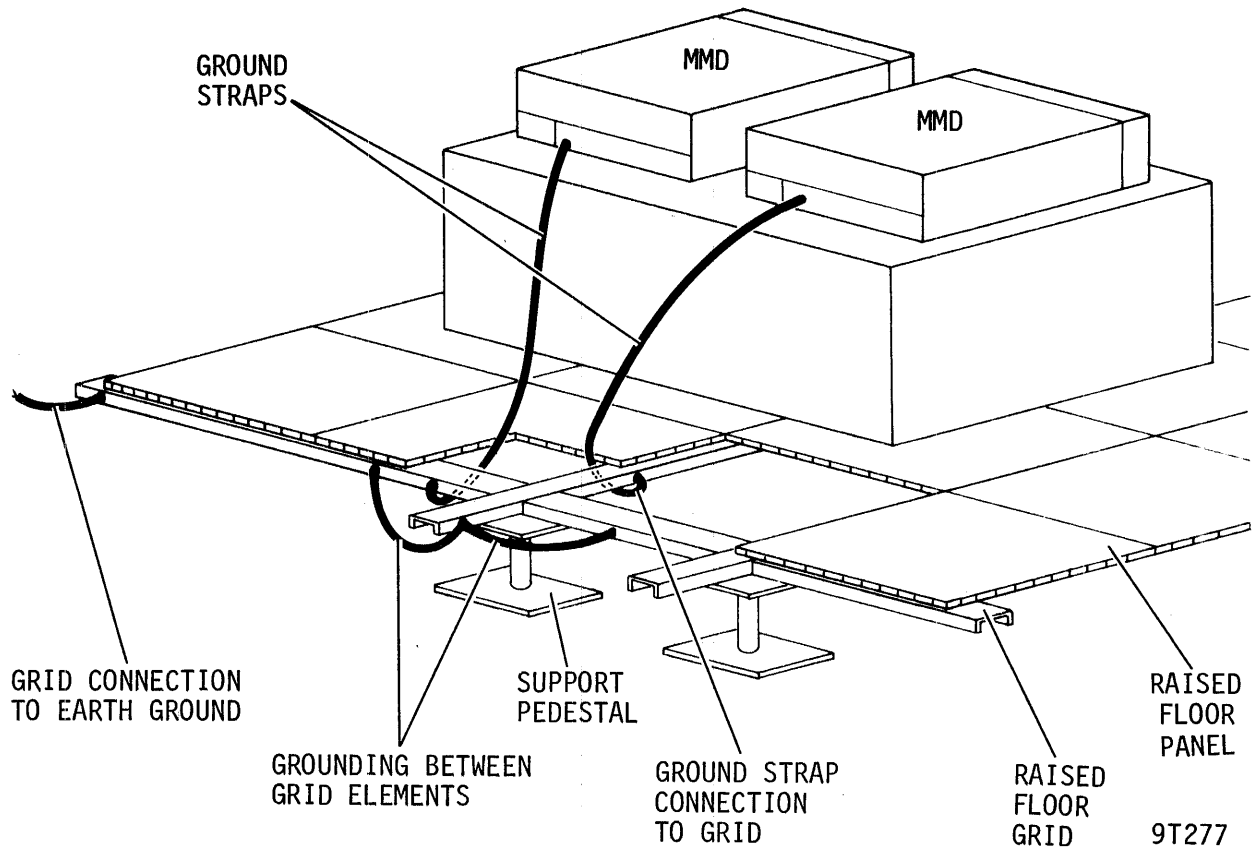


Figure 1-3. Typical Floor Grid

If the site has no floor grid, the controller and MMDs must be grounded with a system of heavy ground straps. This can be a star or a daisy chain system, but star connecting the units is preferable. A star system has ground straps fanning out from the controller to each drive; a daisy chain system has ground straps going from drive to drive and then to the controller. In both systems the controller must be connected to earth ground.

When drives are added to an existing system, the grounding must be consistent within the system. For instance, do not star connect a new drive when the other units are daisy chained together.

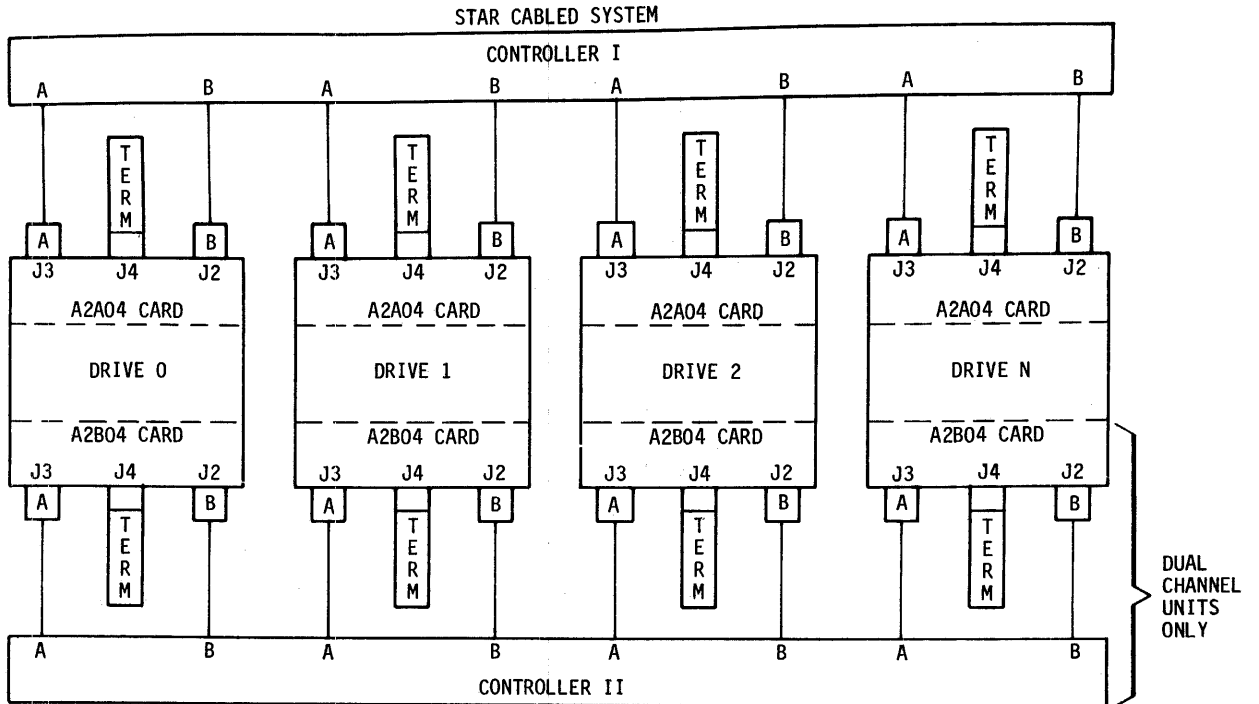
INTERFACE REQUIREMENTS

An important part of site preparation is planning the layout and routing of I/O cables. The I/O cables are designated as A and B cables. The I/O A cables may be connected in either a star or daisy chain configuration as shown in figure 1-4. Each configuration calls for the use of terminators; these too are shown in figure 1-4.

The following discussion of the I/O configurations applies to single channel installations where a set of drives are interfaced to one controller. Extending the discussion to dual channel installations (involving two controllers) requires doubling the quantities of cables and terminators because the two channels have independent cabling.

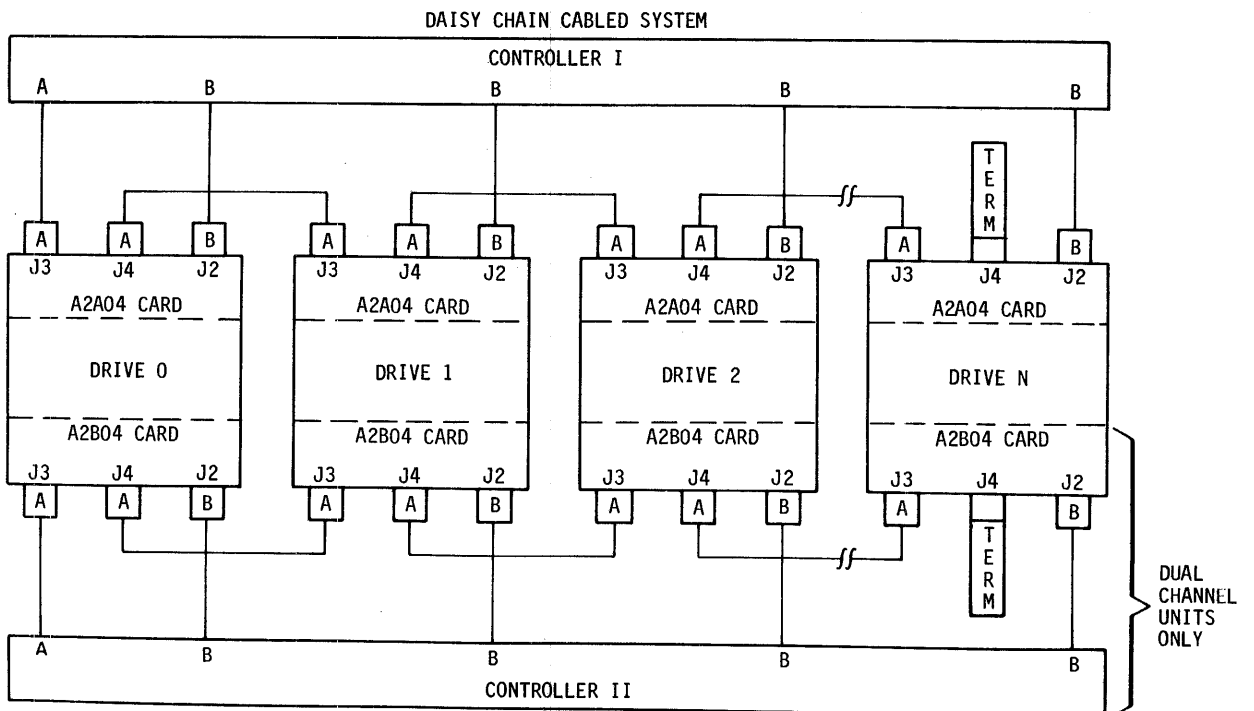
The star configuration has individual A and B cables going from the controller to each drive, and each drive has a terminator installed on it. The daisy chain configuration has individual B cables going from the controller to each drive. However, a single A cable connects the controller to the first drive. Other A cables go from drive to drive, and the last drive in the string has a terminator installed on it.

In estimating the I/O cables needed for an installation, decide which configuration will be used and allow sufficient length to permit extension of rack-mounted drives. Limitations on I/O cable lengths may influence system layout. The maximum length for each B cable is 15.3 m (50 ft). Each star system A cable or the cumulative A cabling in a daisy chain system cannot exceed 30.6 m (100 ft) in length. Table 1-2 lists the part numbers for the terminator and for the available lengths of I/O cables.



NOTES:

1. MAXIMUM INDIVIDUAL A CABLE LENGTHS = 100 FEET
2. MAXIMUM INDIVIDUAL B CABLE LENGTHS = 50 FEET



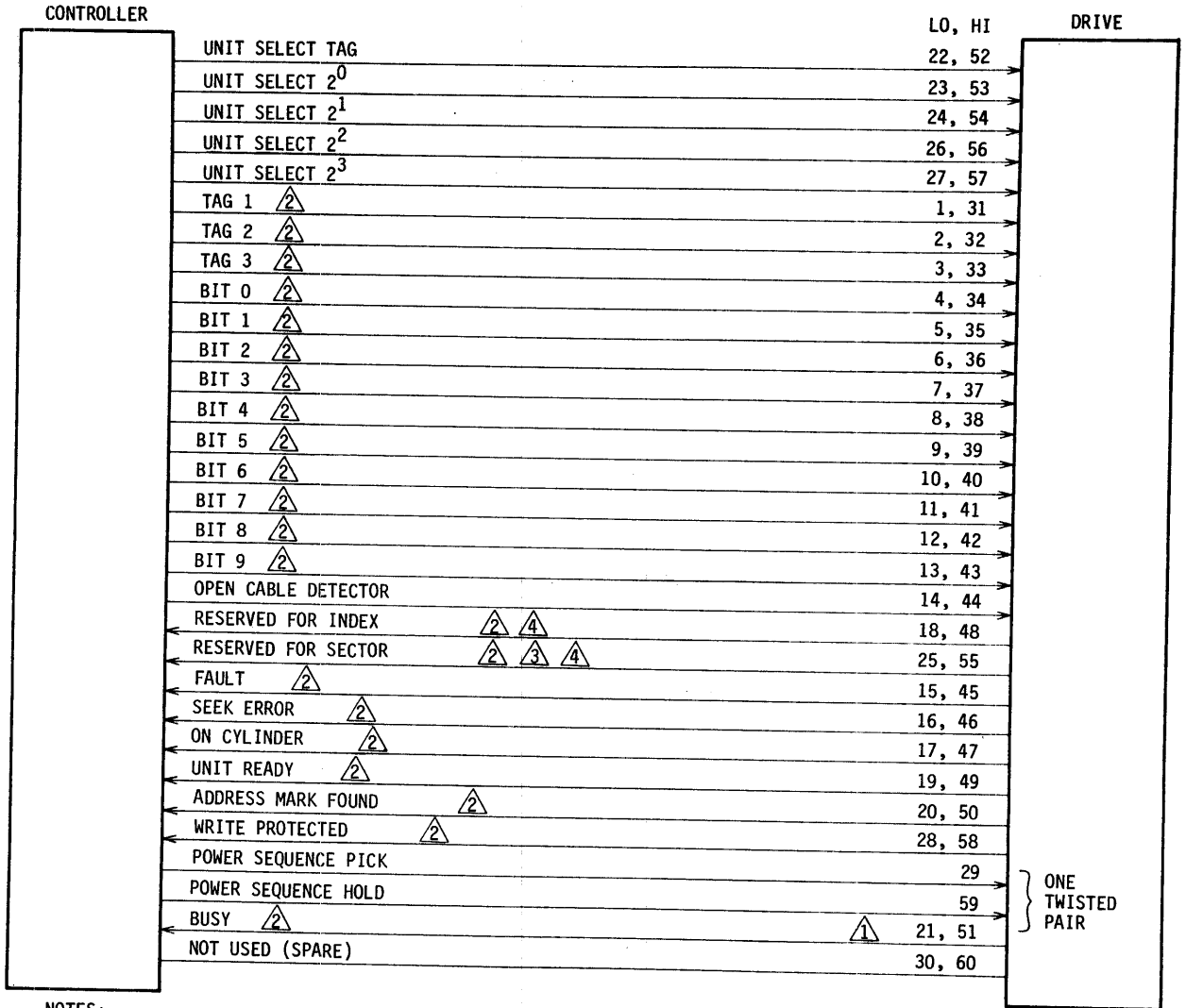
9T278

Figure 1-4. System Cabling





TABLE 1-2. I/O CABLES AND ACCESSORIES

Length		Part Numbers	
(Feet)	(Metres)	A Cable	B Cable
5	1.5	77564200	77564300
6	1.8	77564201	77564301
8	2.4	77564202	77564302
10	3.0	77564203	77564303
15	4.5	77564204	77564304
20	6.1	77564205	77564305
25	7.6	77564206	77564306
30	9.1	77564207	77564307
40	12.2	77564208	77564308
50	15.3	77564209	77564309
I/O Terminator Part Number: 75841300			

Figure 1-5 shows the pin assignments and signal names for the A cable. Figure 1-6 shows the pin assignments and signal names for the B cable. Detailed information about interface lines is given in section 3 of the hardware reference manual.



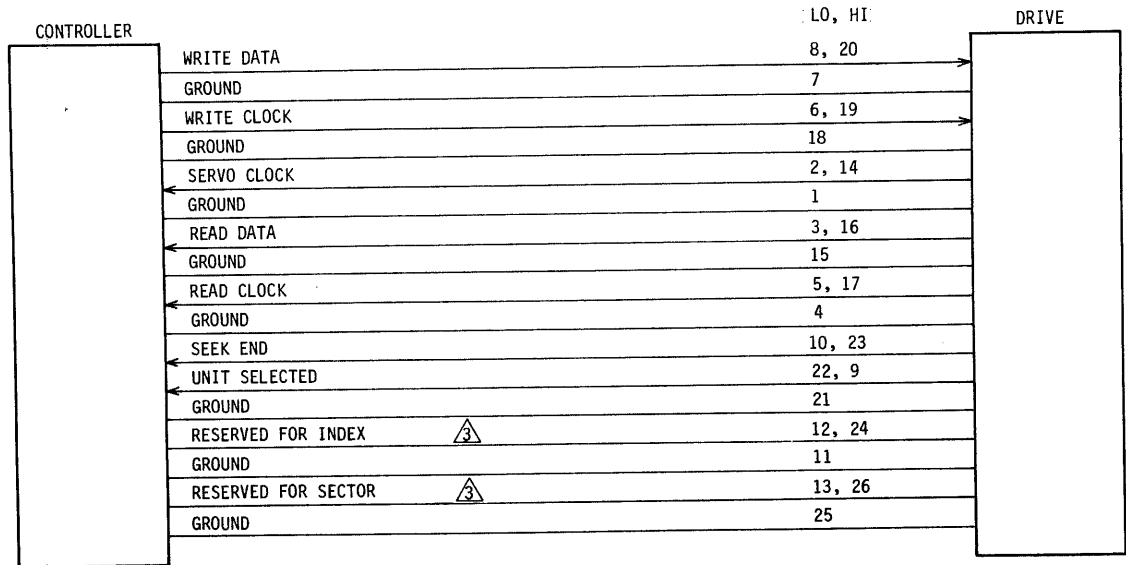
NOTES:

-  DUAL CHANNEL UNITS ONLY
-  GATED BY UNIT SELECT
-  CALLED SECTOR MOD ON BZ9A1J/K/L/M AND BZ9A5E/F
-  INDEX AND SECTOR MAY BE IN "A" CABLE AND/OR "B" CABLE.

9T292B

Figure 1-5. A Cable

"B" CABLE



NOTES:

- 1 26 CONDUCTORS FLAT CABLE. MAXIMUM LENGTH - 50 FT.
- 2 NO SIGNALS GATED BY UNIT SELECTED.
- INDEX AND SECTOR MAY BE IN "A" CABLE AND/OR "B" CABLE.

9T308A

Figure 1-6. B Cable

FINAL UNPACKAGING AND INSPECTION

GENERAL

After removing packaging material according to the unpackaging instructions provided with the drive, inspection for shipping damage should be carried out and several final unpackaging procedures performed. Most packaging materials can be reused if it is necessary to ship the drive at some future date. To obtain packaging instructions, contact:

Packaging Engineer, Material Services Dept.
 Normandale Division, MPI
 7801 Computer Ave
 Minneapolis, MN 55435

When ordering packaging instructions, specify the exact equipment number and series code of the drive as shown on the equipment identification label.

UNPACKAGING

1. Open package (save all packaging materials).
2. If MMD has a slide mount option, remove packages containing two slide mounts.
3. Remove two I/O flat cables packaged around MMD.
4. Remove plastic dust cover from around MMD.
5. Check all items against shipping bill for required equipment and hardware to complete installation. Discrepancies, missing items, damaged equipment, etc., should be reported to the CDC account sales representative responsible for the equipment.

INSPECTION

Inspect all components of the drive for possible shipping damage. All claims for shipping damage should be filed with the carrier involved.

INSTALLATION PROCEDURES

GENERAL

The following text provides the procedures necessary to install the drive. It is assumed that the requirements for site preparation have been completed prior to performing the installation procedures.

The following procedures should be considered in the order presented, but the order may be altered for a specific installation:

- Mounting In Rack
- System Grounding
- Transformer Wiring
- System Cabling
- Setting Logic Card Switches.

MOUNTING IN RACK

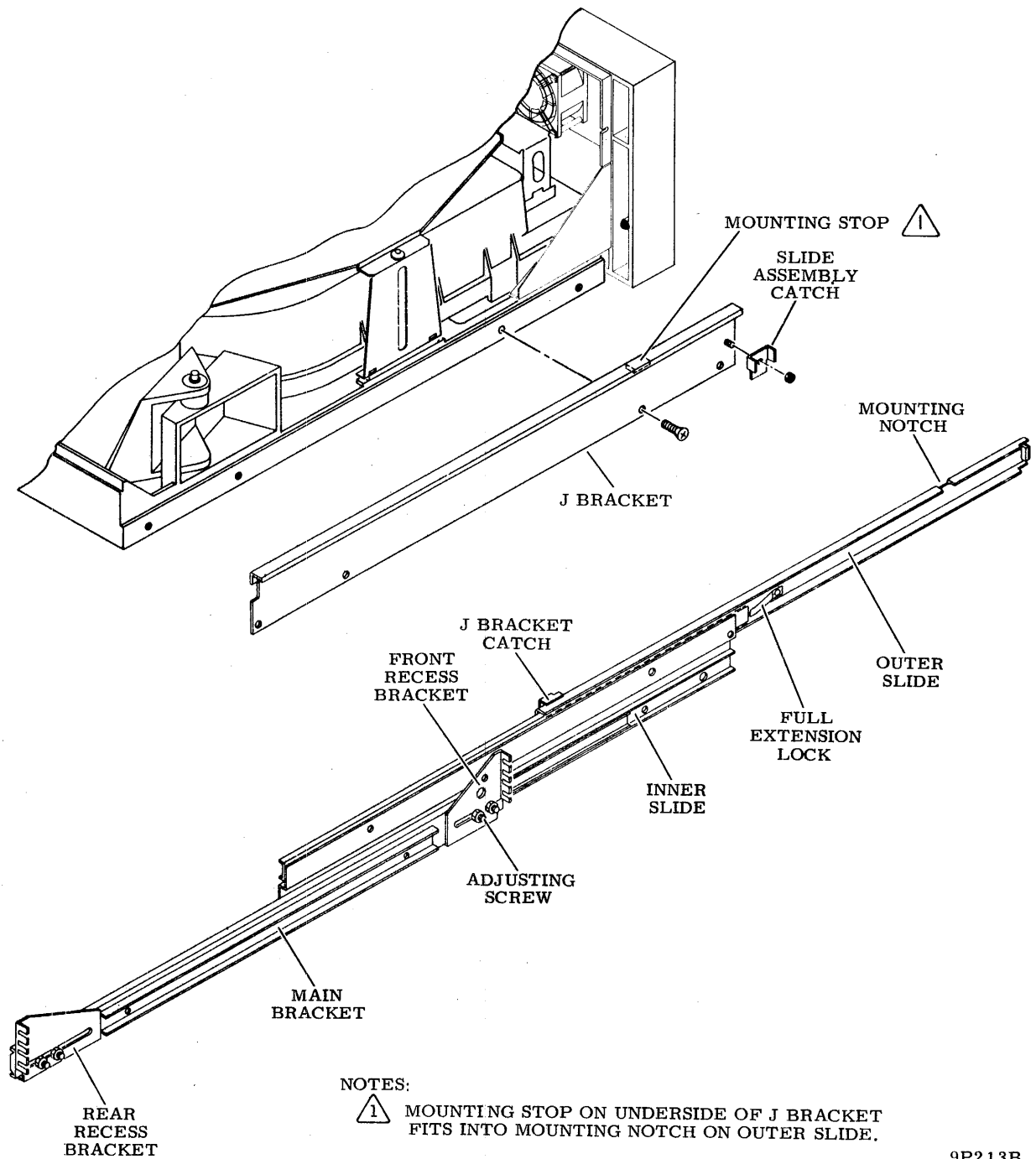
The MMD can be slide mounted onto a standard 483 mm (19 in) rack. Figure 1-7 shows an exploded view of the mounting hardware for the MMD.

1. Loosely attach screws, lockwashers, and nut plates to rack. Leave this hardware loose enough so that the slotted recess brackets at the ends of the slide assembly can be inserted between nut plate and rack.
2. Loosen adjusting screws on front and rear recess brackets such that slide assemblies can be positioned in rack.
3. Position slide assemblies in rack and tighten hardware securing slide assemblies to rack.
4. Tighten adjusting screws on recess brackets .
5. Ensure that slide assemblies are aligned horizontally and vertically, and that assemblies are parallel.
6. Install latch keeper bracket on left side of rack so it will mate with front panel latch in a manner that will not interfere with slide assembly motion.
7. Pull both slide assemblies to their fully extended position, making certain that full extension lock on each slide moves into locked position.
8. Loosen and lower J bracket catch (at front of each slide assembly).

NOTE

The following step may require two people.

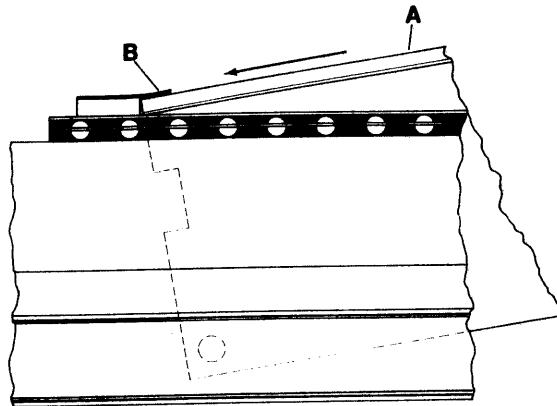
9. Place MMD (with J brackets attached) onto slide assemblies, making certain that J bracket slips under the J bracket catch at the rear of each outer slide. Figure 1-8 shows the sequence of steps required to mount the drive on the slides. Ensure that mounting stop on underside of each J bracket fits into mounting notch on each outer slide.



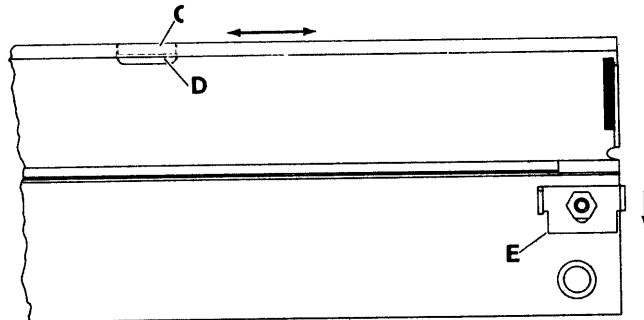
9P213B

Figure 1-7. MMD Installation

- ① SLIDE J BRACKET (A)
UNDER J BRACKET
CATCH (B).



- ② LOCATE MOUNTING
STOP (C) IN
MOUNTING NOTCH (D)
WITH SLIDE ASSY
CATCH (E) DOWN.



- ③ SECURE SLIDE ASSY
CATCH (E) AGAINST
OUTER SLIDE (F)
TIGHTEN NUT (G).

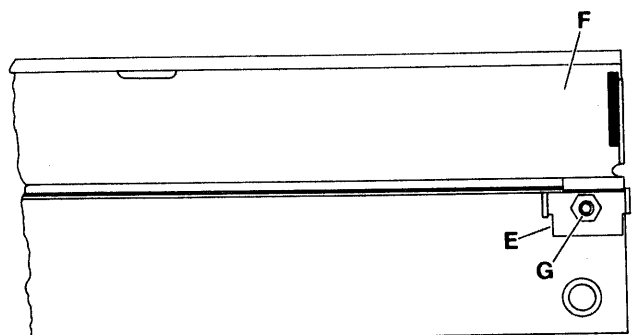
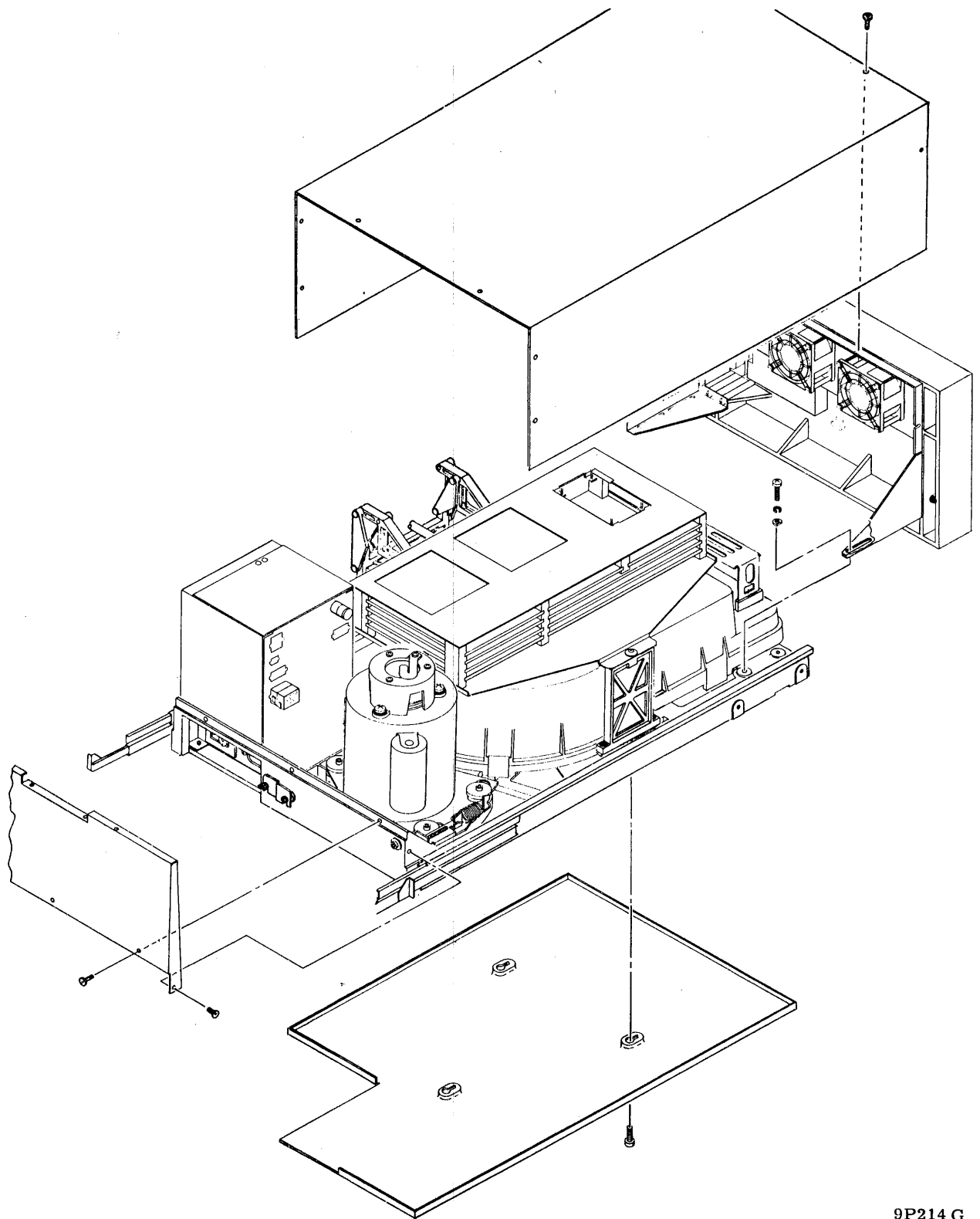


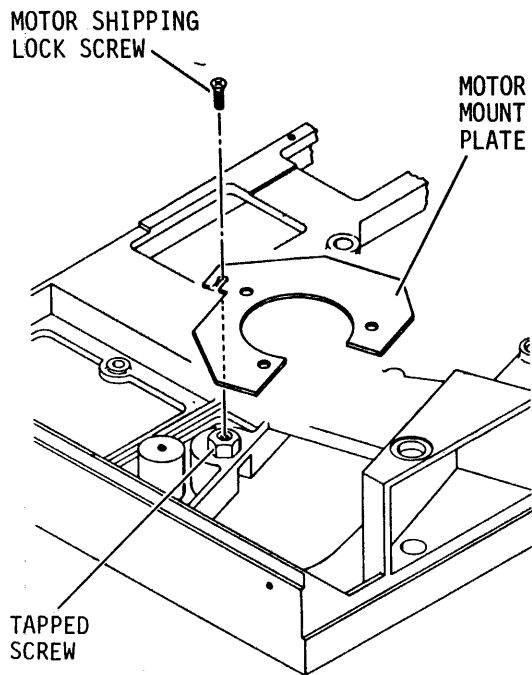
Figure 1-8. Slide Mounting Sequence

9T262

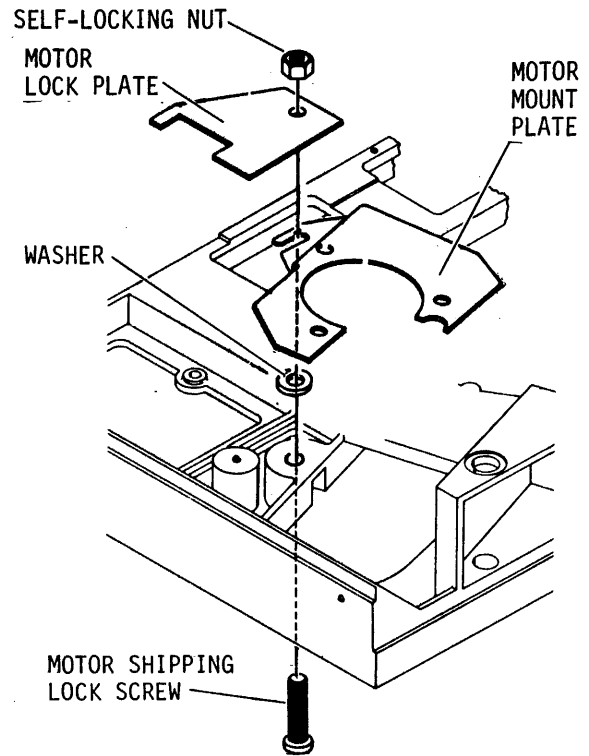


9P214 G

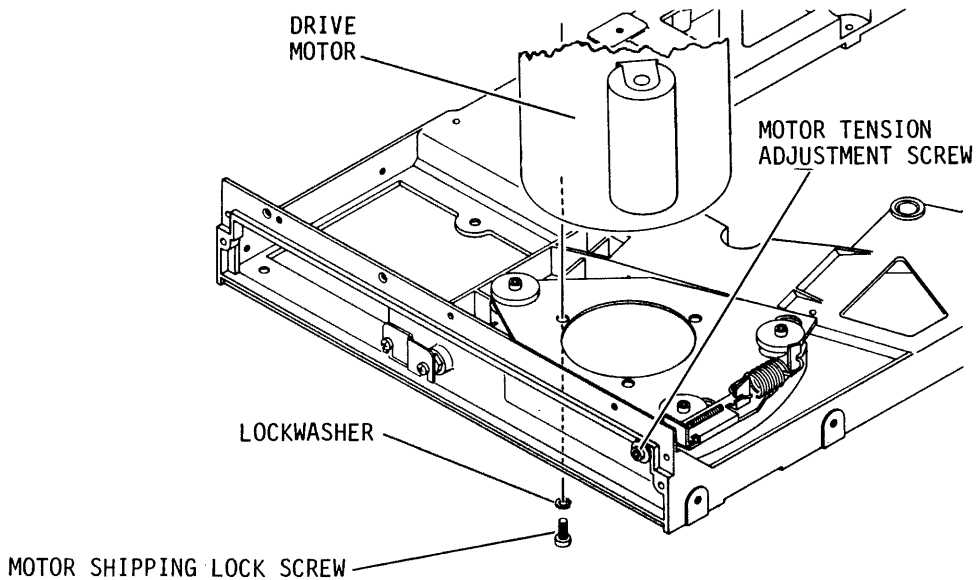
Figure 1-9. Cover Removal



TYPE A



TYPE B



TYPE C

9T351

Figure 1-9.1 Unlocking Drive Motor

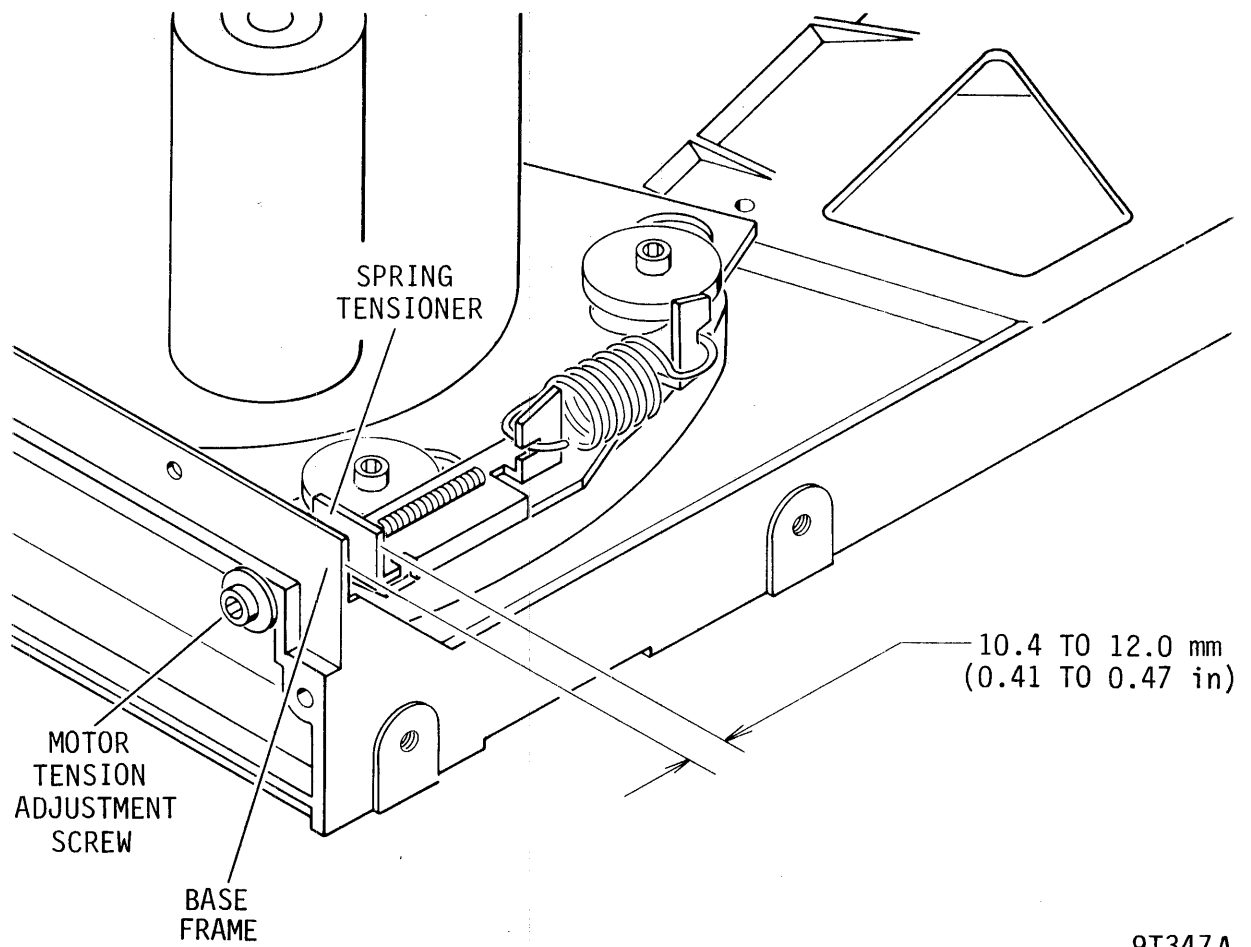


Figure 1-10. Motor Tension Adjustment

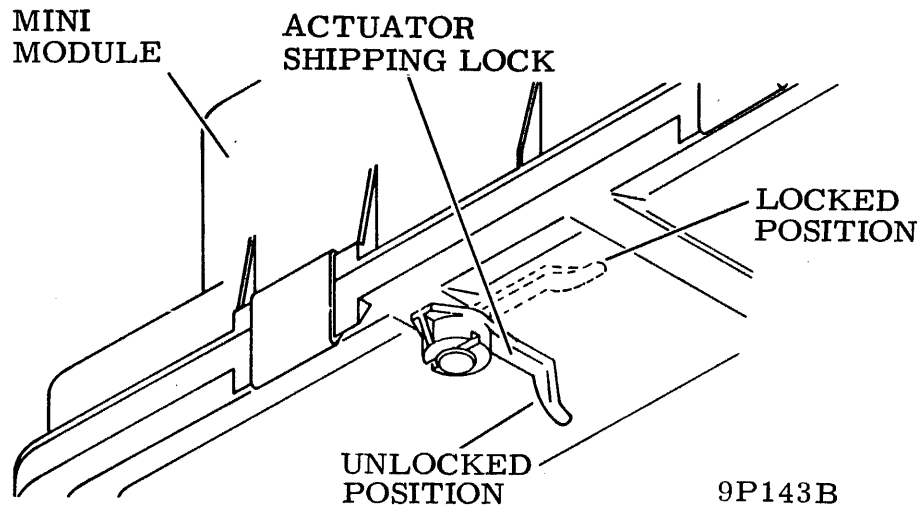


Figure 1-11. Actuator Shipping Lock

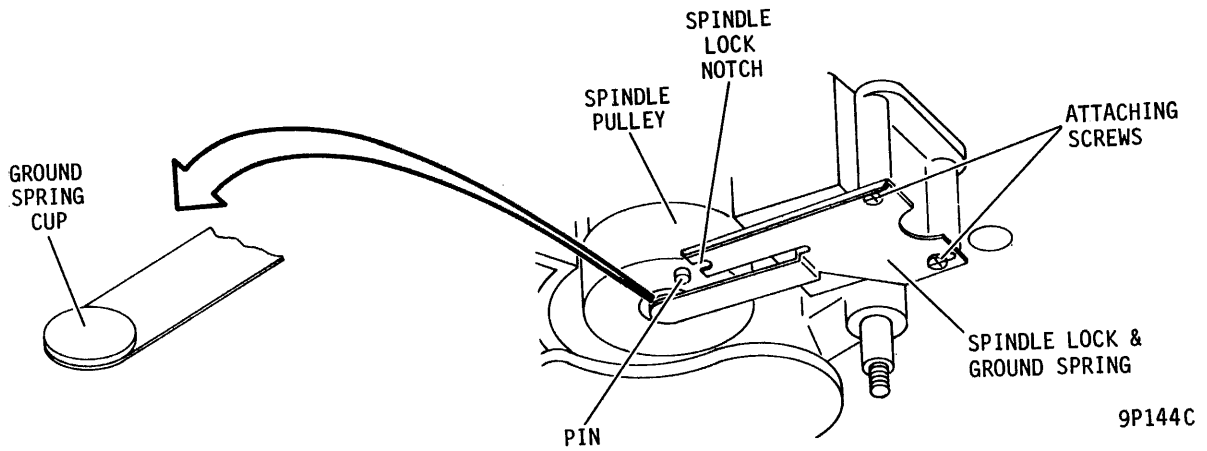


Figure 1-12. Spindle Lock and Ground Spring

SYSTEM GROUNDING

General

This section contains instructions on making the system grounding connections. It is assumed that the site has been prepared in accordance with the site requirements information provided earlier in this section. Refer to that discussion if there is any doubt about which grounding scheme to use. System grounding procedures are presented in the following sections:

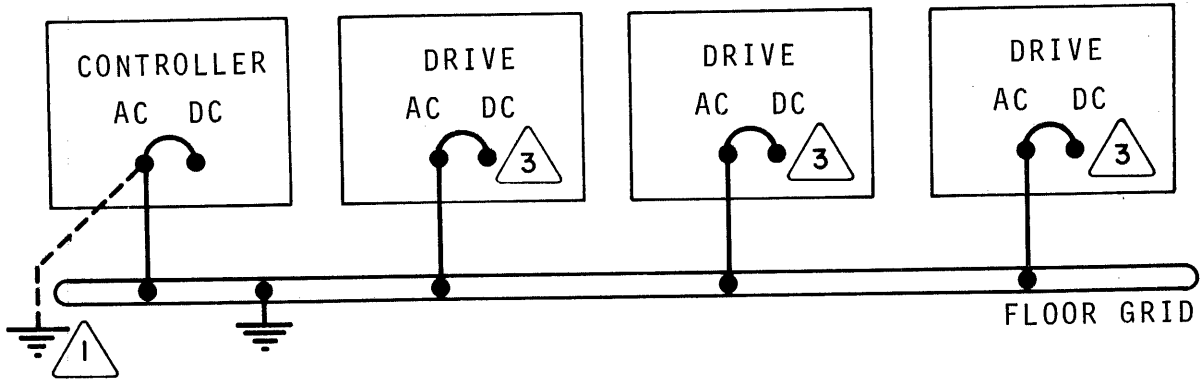
- Floor Grid Grounding Procedure
- Star Grounding Procedure
- Daisy Chain Grounding Procedure
- Isolated Grounds

Floor Grid Grounding Procedure

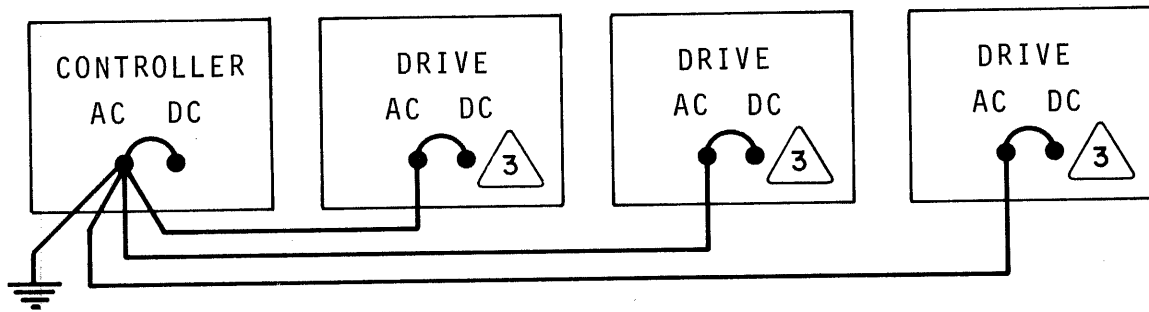
This procedure describes how to ground the system to a floor grid as shown in figure 1-13. In this configuration, ground straps connect the controller and drives to the floor grid. In addition, if the floor grid is isolated from earth ground, the controller is connected to earth ground.

1. Prepare ground straps as follows (see table 1-3):
 - a. Allowing sufficient length for drive extension, cut ground straps to length needed for the following connections:
 - Controller to floor grid
 - Controller to earth ground (if necessary)
 - Each drive to floor grid
 - b. Crimp and solder terminal lugs to both ends of each ground strap.
2. Connect ground strap between controller ground terminal and floor grid (see step 5 for floor grid connection). If necessary, connect another ground strap between controller ground and earth ground.

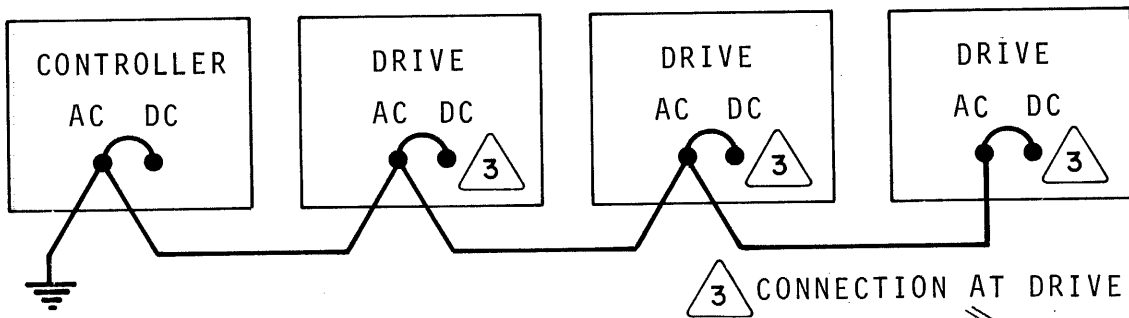
FLOOR GRID AVAILABLE



FLOOR GRID UNAVAILABLE - STAR CONFIGURATION



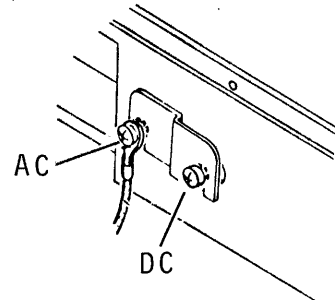
FLOOR GRID UNAVAILABLE - DAISY CHAIN CONFIGURATION



NOTES:

1 REQUIRED IF FLOOR GRID IS NOT GROUNDED

2 COMMON GROUND STRAP
GROUND BAR ON DRIVE
EARTH GROUND



9T272

Figure 1-13. System Grounding Schemes (Not Isolated)

TABLE 1-3. GROUNDING ACCESSORIES

<u>Part</u>	<u>Part Number</u>
Flat Braided Shielding	93267009 15 m (50 ft)
Terminal Lug	40125601
Lockwasher, external tooth, #10	10126403
Screw, thread rolling, 10-32 x 1/2	17901524

NOTE

For newer drives having ac and dc ground screws and a ground bar, perform step 3. For older drives having only one ground screw, perform step 4.

3. Referring to figure 1-14, attach ground strap to ac ground at each drive as follows:
 - a. Loosen both ac and dc ground screws.
 - b. Remove ground bar and set it aside.
 - c. Remove ac ground screw and lock washers.
 - d. Insert ac ground screw through terminal lug of ground strap and then through two lock washers.
 - e. Attach ac ground screw loosely to base frame.
 - f. Replace ground bar so that it is inserted between the pair of lock washers on each screw.
 - g. Tighten both ac and dc ground screws.

4. Attach ground strap to ac ground at each drive as follows:
 - a. Remove ground screw and lock washers at rear of drive.
 - b. Place ground strap terminal lug between lock washers and attach it with ground screw to base frame.
5. Connect each ground strap to floor grid as follows:
 - a. Route free end of ground strap through floor cutout.
 - b. Drill a 0.9 mm (11/32 in) hole in floor grid.
 - c. Secure terminal lug to floor grid using screw and lock washer. Lock washer goes between terminal lug and floor grid.

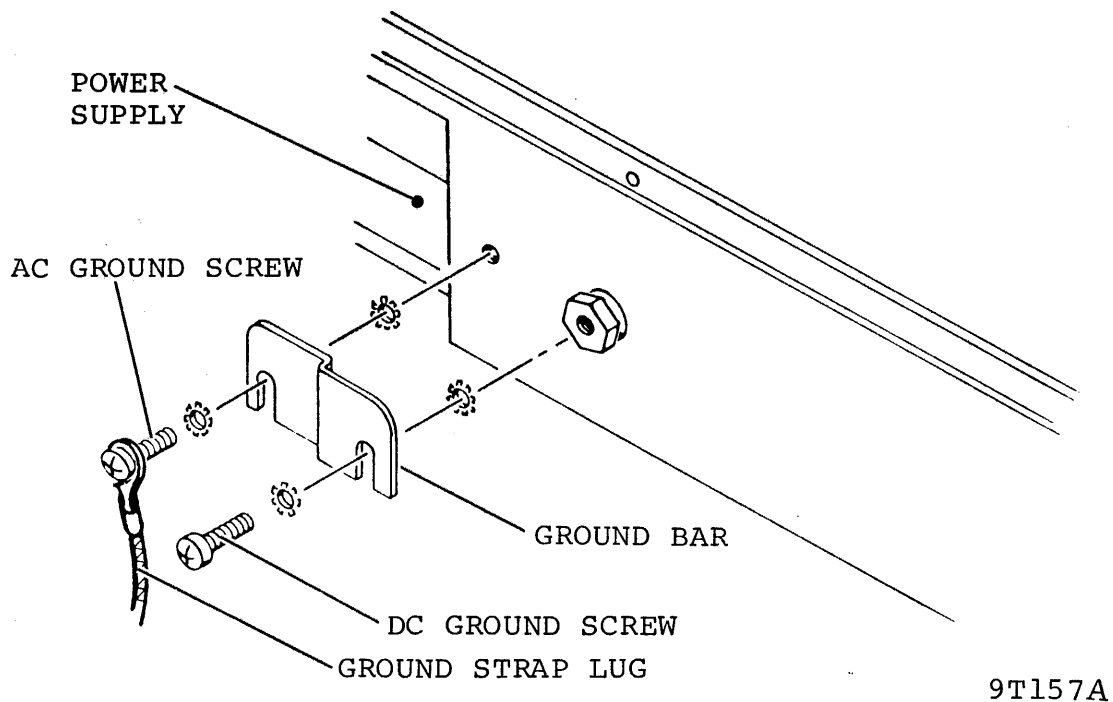


Figure 1-14. Drive Grounding Terminals

Star Grounding Procedure

This procedure describes how to ground the system in a star configuration as shown in figure 1-13. In this configuration, ground straps connect the controller to earth ground and to each drive in the system.

1. Prepare ground straps as follows (see table 1-3):
 - a. Allowing sufficient length for drive extension, cut ground straps to length needed for the following connections:
 - Controller to earth ground
 - Controller to each drive
 - b. Crimp and solder terminal lugs to both ends of each ground strap.
2. Connect one end of all ground straps to controller ground terminal. Connect one strap to earth ground and route other straps to each drive in system.

NOTE

For newer drives having ac and dc ground screws and a ground bar, perform step 3. For older drives having only one ground screw, perform step 4.

3. Referring to figure 1-14, attach ground strap to ac ground at each drive as follows:
 - a. Loosen both ac and dc ground screws.
 - b. Remove ground bar and set it aside.
 - c. Remove ac ground screw and lock washers.
 - d. Insert ac ground screw through terminal lug of ground strap and then through two lock washers.
 - e. Attach ac ground screw loosely to base frame.
 - f. Replace ground bar so that it is inserted between the pair of lock washers on each screw.
 - g. Tighten both ac and dc ground screws.

4. Attach ground strap to ac ground at each drive as follows:
 - a. Remove ground screw and lock washers at rear of drive.
 - b. Place ground strap terminal lug between lock washers and attach it with ground screw to base frame.

Daisy Chain Grounding Procedure

This procedure describes how to ground the system in a daisy chain configuration as shown in figure 1-13. In this configuration, ground straps connect the controller to earth ground and to the first drive in the daisy chain. The remainder of the drives are connected by ground straps going from the first drive to the second, the second to the third, and so on.

1. Prepare ground straps as follows (see table 1-3):
 - a. Allowing sufficient length for drive extension, cut ground straps to length needed for the following connections:
 - Controller to earth ground
 - Controller to nearest drive
 - Each drive to next drive in daisy chain.
 - b. Crimp and solder terminal lugs to both ends of each ground strap.
2. Connect two straps to controller ground terminal. Connect one strap to earth ground and route other strap to first drive in daisy chain.

NOTE

For newer drives having ac and dc ground screws and a ground bar, perform step 3. For older drives having only one ground screw, perform step 4.

3. Route ground straps between drives, and referring to figure 1-14, attach ground straps to ac ground at each drive as follows:
 - a. Loosen both ac and dc ground screws.
 - b. Remove ground bar and set it aside.

- c. Remove ac ground screw and lock washers.
 - d. Insert ac ground screw through terminal lug of ground strap and then through two lock washers.
 - e. Attach ac ground screw loosely to base frame.
 - f. Replace ground bar so that it is inserted between the pair of lock washers on each screw.
 - g. Tighten both ac and dc ground screws.
4. Route ground straps between drives and attach ground straps to ac ground at each drive as follows:
- a. Remove ground screw and lock washers at rear of drive.
 - b. Insert ground screw through terminal lugs of both ground straps with lock washers on either side of each terminal lug.
 - c. Attach ground screw to base frame.

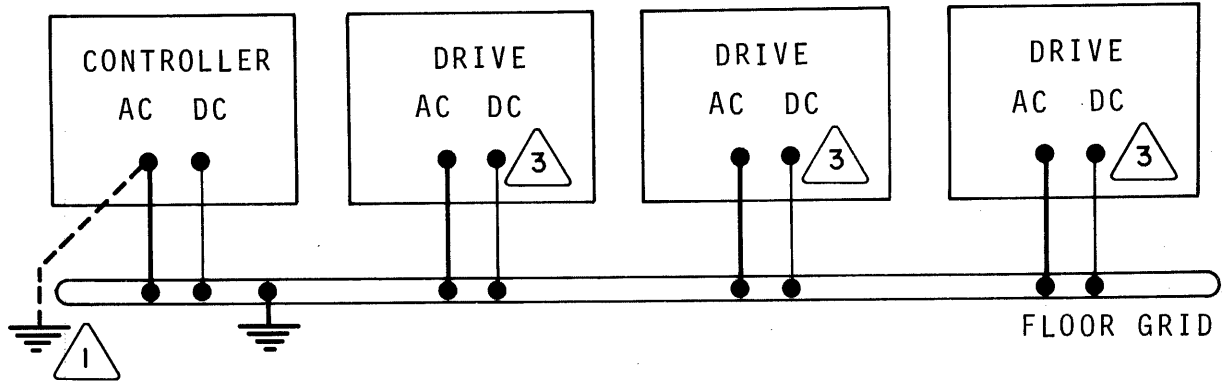
Isolated Grounds

Isolated grounding consists of parallel systems that accomplish ac (frame) and dc (logic) grounding separately. In some cases, system performance is improved with isolated grounds. However, the common grounding approach already presented is generally superior and should be used if it results in satisfactory operation.

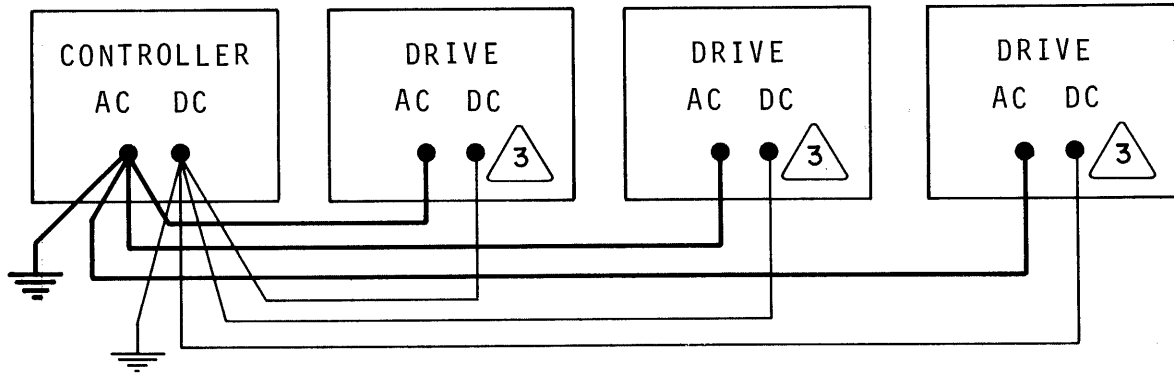
Isolated grounding is possible only with the newer drives having ac and dc ground screws and a ground bar. In the older drives having one ground screw, ac and dc grounds are tied together inside the drive.

The three isolated grounding configurations are shown schematically in figure 1-15. A comparison of figure 1-15 with figure 1-13 reveals that for each configuration, the ac grounding system is parallel to the dc grounding system. Furthermore, the ground bar is secured vertically by the ac ground screw so that the two ground screws are not shorted together at the drive.

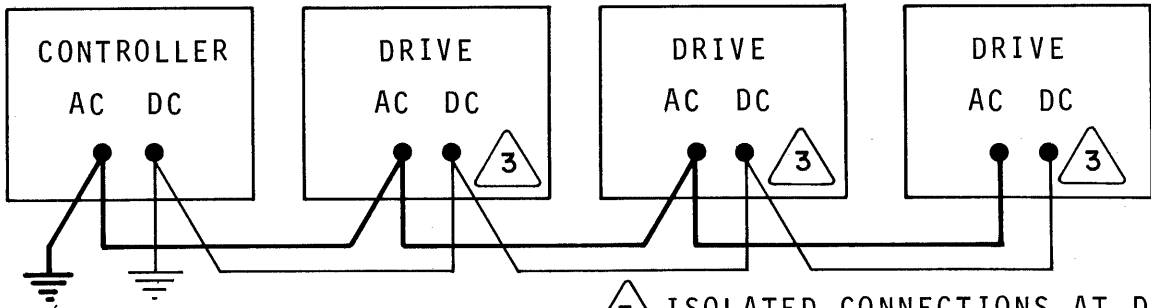
FLOOR GRID AVAILABLE



FLOOR GRID UNAVAILABLE - STAR CONFIGURATION



FLOOR GRID UNAVAILABLE - DAISY CHAIN CONFIGURATION

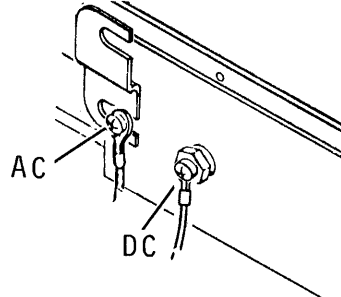
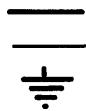


3 ISOLATED CONNECTIONS AT DRIVE

NOTES:

1 REQUIRED IF FLOOR GRID IS NOT GROUNDED

2 AC GROUND STRAP
DC GROUND STRAP
EARTH GROUND



9T273

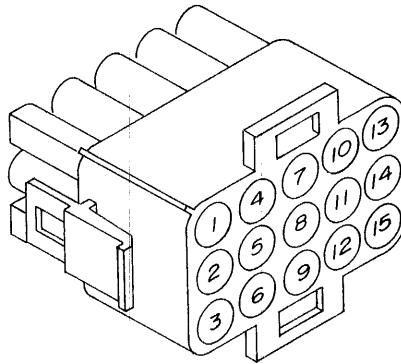
Figure 1-15. System Grounding Schemes (Isolated)

TRANSFORMER WIRING

The power supply transformer is designed to accept various ac input voltages. The input voltage is applied to the proper transformer primary windings by jumper wires on the power selector plug P07, located on the power supply. A drive is shipped ready to accept the input voltage and frequency listed in the configuration chart that appears in the front matter of this manual.

To convert the drive to another voltage input, remove plug P07 (shown in figure 1-16) and refer to the logic diagrams section in this manual for jumper wiring information. After rewiring the plug, revise its power label, and reinstall it on the power supply.

To convert the drive from 60 to 50 Hz, from 50 to 60 Hz, or to 100 V - 50 Hz requires extensive changes. For further information contact the CDC Account Sales Representative.



NOTE: CROSS REF 011 OF LOGIC DIAGRAMS
SPECIFIES JUMPER WIRING FOR
EACH INPUT VOLTAGE.

9P167A

Figure 1-16. Power Selector Plug

SYSTEM CABLING

This procedure describes how to connect the drive power cord, I/O cables, and terminators. It is assumed that the site has been prepared in accordance with the site preparation information provided earlier in this section. Refer to that discussion for cable routing and power outlet information.

Figure 1-17 shows where the I/O cables are connected at the logic chassis and provides an exploded view of the mounting hardware for the I/O cables. The power cords supplied with 60 and 50 Hz drives are shown in figure 1-18.

1. Connect power cord to power connector AlJ01 at rear of drive and to site ac power source.
2. Connect B cable from channel I controller to drive connector J2 on card A2A04. For dual channel drives, connect a second B cable from channel II controller to drive connector J2 on card A2B04.

NOTE

Steps 3, 4, and 5 apply only to drives using star I/O cabling configuration.

3. Connect A cable from channel I controller to drive connector J3 on card A2A04.
4. Install terminator on drive connector J4 and make terminator ground connection. Both connections are made on card A2A04 (see figure 1-19).
5. For dual channel drives, repeat steps 3 and 4 to connect channel II A cable and terminator to card A2B04.

NOTE

Steps 6 through 9 apply only to drives using daisy chain I/O cabling configuration. In these steps, upstream and downstream define drives adjacent to a particular drive in daisy chain with upstream drive closer to controller.

6. Connect A cable to drive connector J3 on card A2A04 either from channel I controller or from connector J4 on card A2A04 of upstream drive.

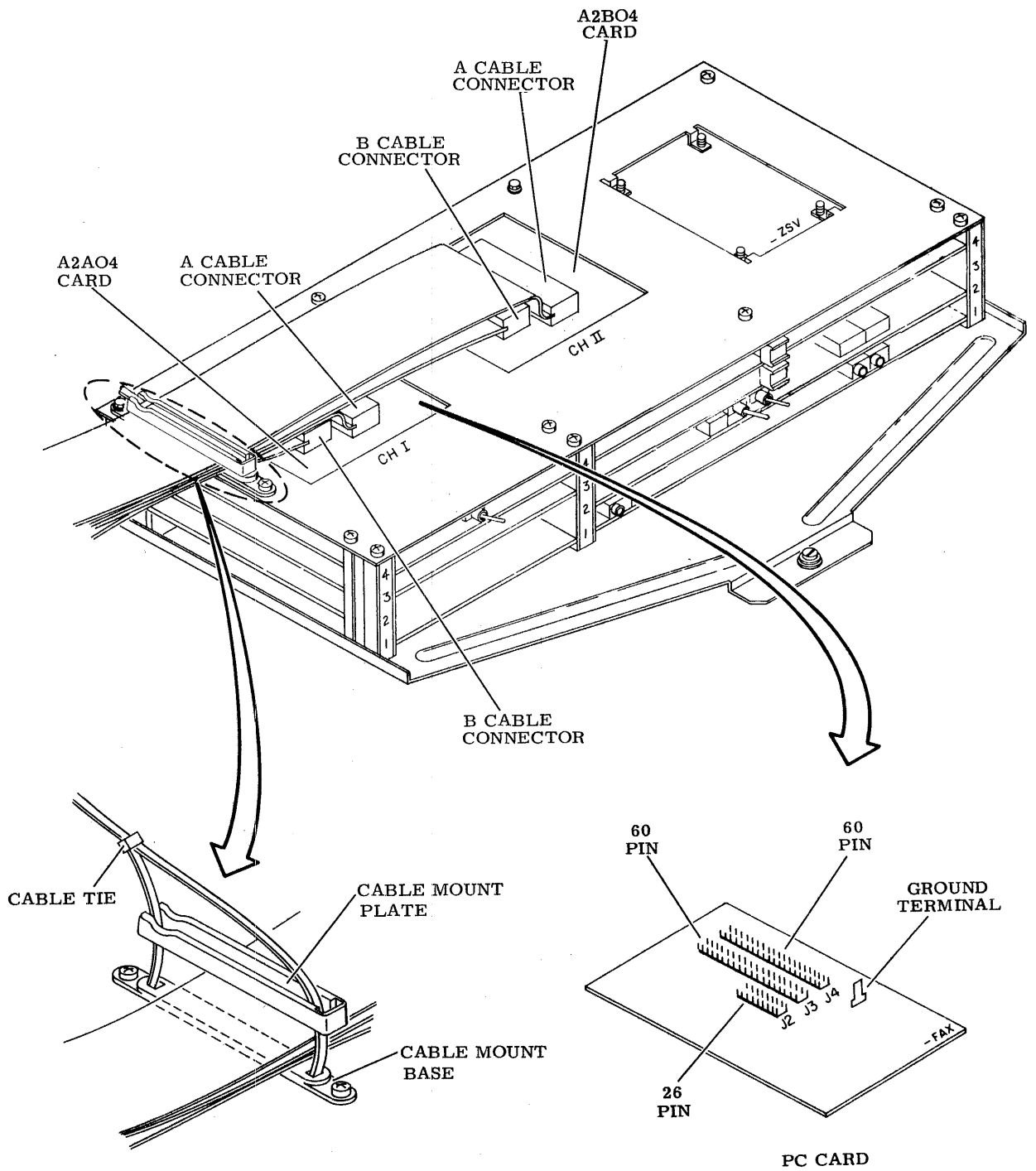
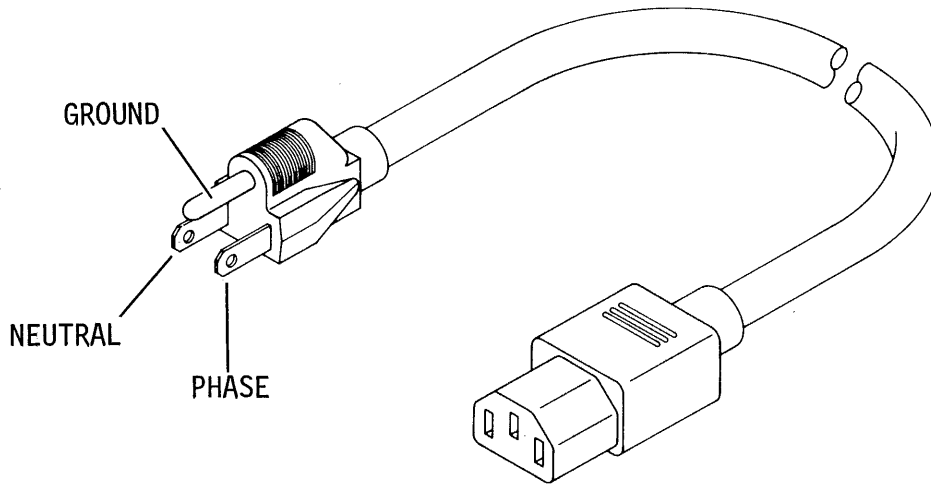
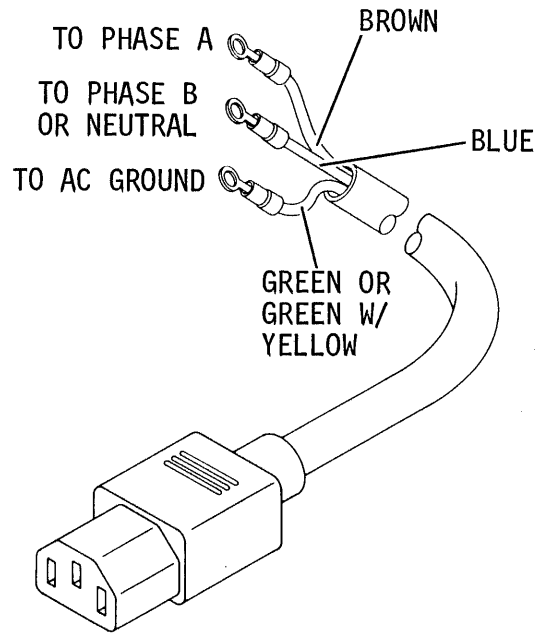


Figure 1-17. I/O Cable Attachment

9P206 C



60 Hz POWER CORD



50 Hz POWER CORD

9T279

Figure 1-18. AC Power Cables

NOTE

If drive is not last in daisy chain, perform step 7. If drive is last in daisy chain, perform step 8.

7. Connect another A cable from drive connector J4 on card A2A04 to downstream drive's connector J3 on card A2A04.
8. Install terminator on drive connector J4 and make ground connection. Both connections are made on card A2A04 (see figure 1-19).
9. For dual channel drives, repeat steps 6 through 8 to connect channel II A cables, or A cable and terminator, to card A2B04.

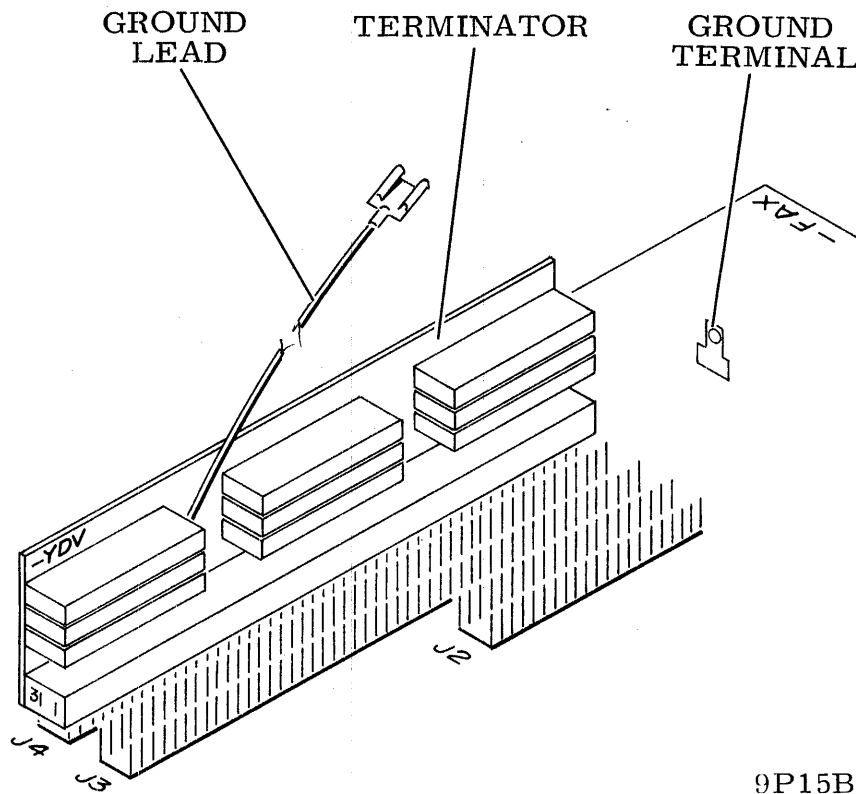


Figure 1-19. Terminator Assembly

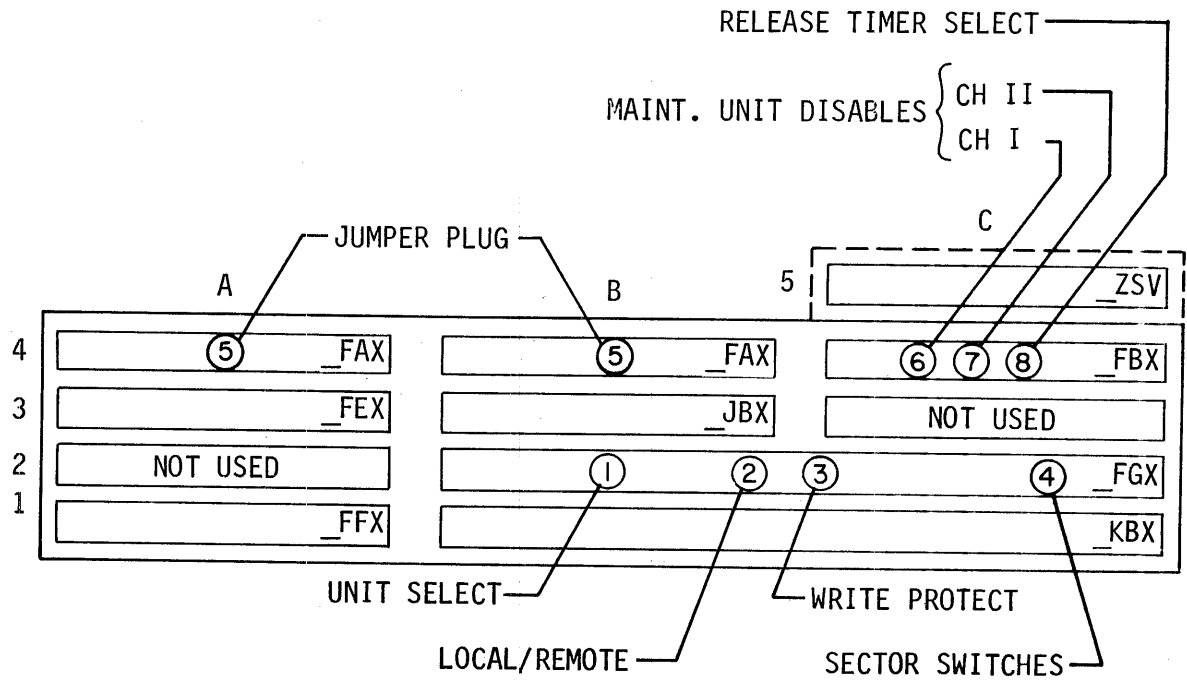
10. Secure I/O cables to drive logic chassis and rear panel as follows:
 - a. Arrange cables so they lie flat on both cable mount bases (see figure 1-17).
 - b. Remove cable mount plates and cable ties from accessories packaged with MMD.
 - c. Thread a cable tie through channel in each cable mount base and through hole in each cable mount plate.
 - d. Tighten cable ties so that cables are secured between base and plate of each cable mount.

This completes the process of system cable attachment. If the I/O cables must be detached for maintenance purposes, remove the screws securing cable mounts to the logic chassis and rear panel to avoid cutting cable ties.

SETTING LOGIC CARD SWITCHES

General

The PC cards in the logic chassis contain a number of switches that must be set correctly for normal operation of the drive. Sheet 1 of figure 1-20 identifies these switches and gives their locations on the logic cards. Sheet 2 of figure 1-20 lists the switches as indexed on sheet 1 and gives the correct settings for normal drive operation for all switches except the sector select switches. Setting the sector select switches is discussed separately in this section.



NOTE:

- ⑤ ON MFAX CARD ONLY
- ⑥ THROUGH ⑧ ON DUAL CHANNEL UNITS ONLY

9T274-1B

Figure 1-20. Setting Logic Card Switches (Sheet 1 of 2)

① UNIT SELECT

		UNIT ADDRESSED [△] 1															
		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
S W I T C H N U M B E R	0	C	0	C	0	C	0	C	0	C	0	C	0	C	0	C	0
	1	C	C	0	0	C	C	0	0	C	C	0	0	C	C	0	0
	2	C	C	C	C	0	0	0	0	C	C	C	C	0	0	0	0
	3	C	C	C	C	C	C	C	C	0	0	0	0	0	0	0	0

② LOCAL/REMOTE LOC: DRIVE POWER UP INDEPENDENT OF CONTROLLER
 REM: DRIVE POWER UP DEPENDENT ON CONTROLLER

③ WRITE PROTECT NORM

④ SECTOR SWITCHES REFER TO DISCUSSION ON SETTING SECTOR SELECT SWITCHES

⑤ INDEX/SECTOR JUMPER PLUG ON MFAX CARD ONLY,
 PLACE JUMPER PLUG BETWEEN "A" AND "COMMON" FOR INDEX AND SECTOR SIGNALS IN A CABLE, OR BETWEEN "A+B" AND "COMMON" FOR INDEX AND SECTOR SIGNALS IN A AND B CABLES.

NOTE:

THE FOLLOWING SWITCHES ARE FOUND ONLY IN DUAL CHANNEL DRIVES:

⑥ CH I MAINT. UNIT DISABLE NORM

⑦ CH II MAINT. UNIT DISABLE NORM

⑧ RELEASE TIMER SELECT ABR: ALLOWS EITHER CONTROLLER TO HOLD DRIVE IN ABSOLUTE RESERVE CONDITION UNTIL RELEASING IT.

RTM: ALLOWS EITHER CONTROLLER TO HOLD DRIVE IN RESERVED CONDITION UNTIL RESERVE TIMEOUT HAS ELAPSED.

[△]1 IN TABLES, C = CLOSED OR ON SETTING, X = DON'T CARE, AND
 0 = OPEN OR OFF SETTING.

9T274-2B

Figure 1-20. Setting Logic Card Switches (Sheet 2)

Figure 1-21 shows the four types of miniature rocker and slide switches used on the logic cards. Refer to the switch illustrations in this figure when verifying that these switches are set as prescribed in figure 1-20.

Setting Sector Select Switches

Figure 1-20 shows the location of the Sector Select switch assembly. The Sector Select switch assembly has twelve independent switches used for selecting sectors. The number of sectors per revolution generated by the drive logic must be matched to that required by the controller. Therefore, sector select switches are provided in the drive logic to allow selection of different sector counts. These switches are located on logic card _FGX and appear as in figure 1-21.

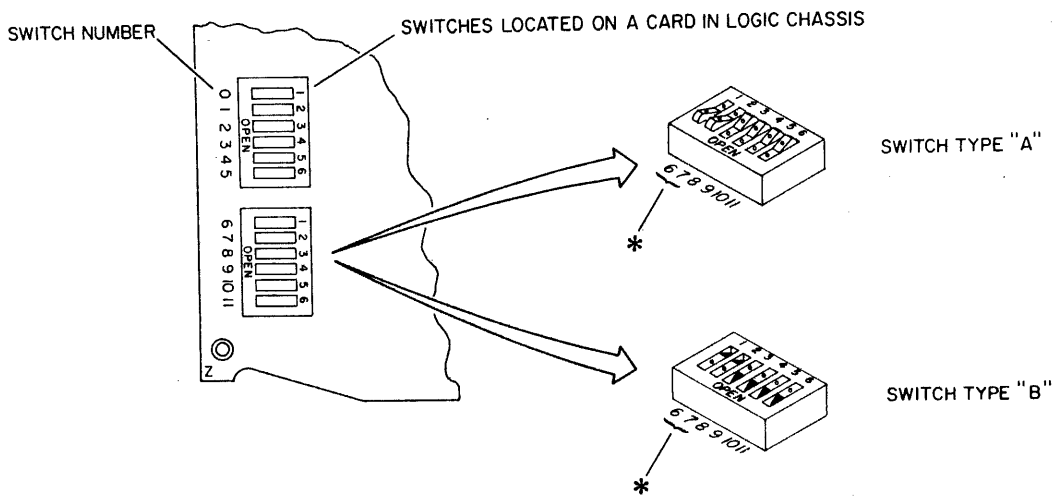
Refer to the subsystem reference manual to determine the number of sectors required by the controller; then locate that number in table 1-4. Across from the number of sectors listed in the table is a row of Cs and Os. C represents the Closed or On position of the sector switch. O represents the Open or Off position of the sector switch. Set the switches to the positions designated in the table while referring to figure 1-21 for an illustration of the switch positions.

The switch settings listed in table 1-4 have been determined from a formula. Use of this formula is demonstrated below to provide the user with an additional tool for determining sector switch settings.

Each sector will contain a certain number of clock pulses (received from the servo tracks). The number of clock pulses in each sector is the result of the number of sectors required by the controller. Thus:

$$\text{Total Sector Clock Pulses} = \frac{13\ 440}{\text{Number of Sectors}} - 1$$

ROCKER-TYPE SWITCHES

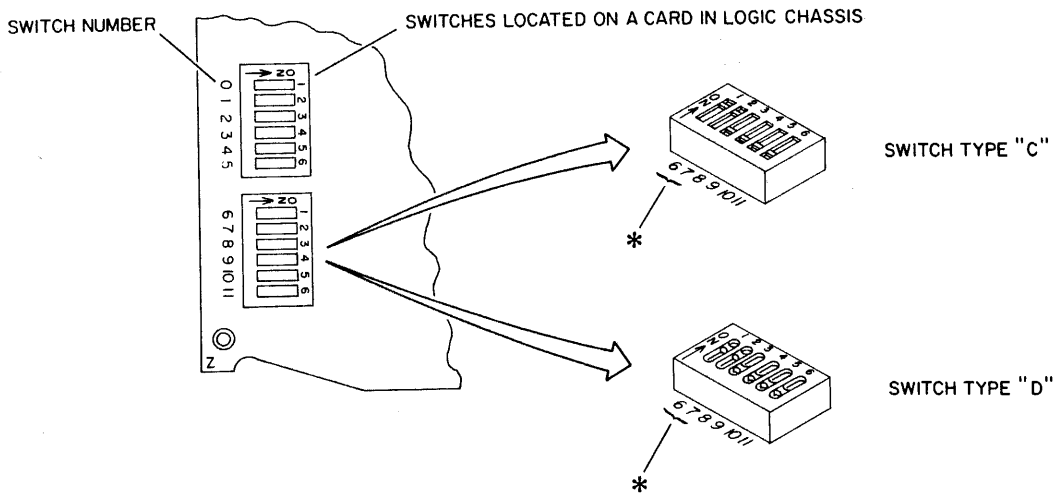


ROCKER-TYPE SWITCHES:

TO ACTUATE A SWITCH TO ITS CLOSED POSITION,
PRESS ON END OF SWITCH FARTHEST FROM "OPEN" LETTERING.

* SWITCHES 6 AND 7 SHOWN IN CLOSED POSITION.

SLIDE-TYPE SWITCHES



SLIDE-TYPE SWITCHES:

TO ACTUATE A SWITCH TO ITS ON POSITION,
SLIDE SWITCH IN DIRECTION OF ARROW SHOWN ON SWITCH.

* SWITCHES 6 AND 7 SHOWN IN ON POSITION.

9H10B

Figure 1-21. Miniature Switches

TABLE 1-4. SECTOR SELECT SWITCH SETTINGS

Number of Sectors	Switch Number											
	0	1	2	3	4	5	6	7	8	9	10	11
4	C	C	C	C	C	O	O	O	C	O	C	C
5	C	C	C	C	C	C	C	O	O	C	O	C
6	C	C	C	C	C	C	O	C	O	O	O	C
7	C	C	C	C	C	C	C	O	C	C	C	O
8	C	C	C	C	O	O	O	C	O	C	C	O
9	O	O	C	O	C	O	C	C	C	O	C	O
10	C	C	C	C	C	C	O	O	C	O	C	O
11	O	O	C	O	O	O	C	C	O	O	C	O
12	C	C	C	C	C	O	C	O	O	O	C	O
13	O	O	O	C	O	O	O	O	O	O	C	O
14	C	C	C	C	C	C	O	C	C	C	O	O
15	C	C	C	C	C	C	C	O	C	C	O	O
16	C	C	C	O	O	O	C	O	C	C	O	O
17	C	O	C	O	C	O	O	O	C	C	O	O
18	C	O	O	C	O	C	C	C	O	C	O	O
19	O	C	O	O	O	O	C	C	O	C	O	O
20	C	C	C	C	C	O	O	C	O	C	O	O
21	C	C	C	C	C	C	C	O	O	C	O	O
22	C	O	O	O	O	C	C	O	O	C	O	O
23	C	C	C	O	O	O	C	O	O	C	O	O
24	C	C	C	C	O	C	O	O	O	C	O	O
25	O	O	O	C	C	O	O	O	O	C	O	O
26	C	C	O	O	O	O	O	O	O	C	O	O
27	O	O	O	O	C	C	C	C	C	O	O	O

Table Continued on Next Page

TABLE 1-4. SECTOR SELECT SWITCH SETTINGS (Contd)

Number of Sectors	Switch Number											
	0	1	2	3	4	5	6	7	8	9	10	11
28	C	C	C	C	C	O	C	C	C	O	O	O
29	O	C	C	C	O	O	C	C	C	O	O	O
30	C	C	C	C	C	C	O	C	C	O	O	O
31	O	O	O	O	C	C	O	C	C	O	O	O
32	C	C	O	O	O	C	O	C	C	O	O	O
33	O	C	C	O	C	O	O	C	C	O	O	O
34	O	C	O	C	O	O	O	C	C	O	O	O
35	C	C	C	C	C	C	C	O	C	O	O	O
36	O	O	C	O	C	C	C	O	C	O	O	O
37	O	C	O	C	O	C	C	O	C	O	O	O
38	O	O	O	O	O	C	C	O	C	O	O	O
39	C	C	C	O	C	O	C	O	C	O	O	O
40	C	C	C	C	O	O	C	O	C	O	O	O
41	O	C	C	O	O	O	C	O	C	O	O	O
42	C	C	C	C	C	C	O	O	C	O	O	O
43	C	C	C	O	C	C	O	O	C	O	O	O
44	O	O	O	O	C	C	O	O	C	O	O	O
45	C	O	O	C	O	C	O	O	C	O	O	O
46	C	C	O	O	O	C	O	O	C	O	O	O
47	O	O	C	C	C	O	O	O	C	O	O	O
48	C	C	C	O	C	O	O	O	C	O	O	O
49	C	O	O	O	C	O	O	O	C	O	O	O
50	C	C	O	C	O	O	O	O	C	O	O	O
51	O	C	C	O	O	O	O	O	C	O	O	O

Table Continued on Next Page

TABLE 1-4. SECTOR SELECT SWITCH SETTINGS (Contd)

Number of Sectors	Switch Number											
	0	1	2	3	4	5	6	7	8	9	10	11
52	C	O	O	O	O	O	O	O	C	O	O	O
53	O	O	C	C	C	C	C	C	O	O	O	O
54	C	C	C	O	C	C	C	C	O	O	O	O
55	C	C	O	O	C	C	C	C	O	O	O	O
56	C	C	C	C	O	C	C	C	O	O	O	O
57	O	C	O	C	O	C	C	C	O	O	O	O
58	O	C	C	O	O	C	C	C	O	O	O	O
59	O	C	O	O	O	C	C	C	O	O	O	O
60	C	C	C	C	C	O	C	C	O	O	O	O
61	C	C	O	C	C	O	C	C	O	O	O	O
62	C	C	C	O	C	O	C	C	O	O	O	O
63	O	O	C	O	C	O	C	C	O	O	O	O
64	C	O	O	O	C	O	C	C	O	O	O	O
65	C	O	C	C	O	O	C	C	O	O	O	O
66	O	C	O	C	O	O	C	C	O	O	O	O
67	C	C	C	O	O	O	C	C	O	O	O	O
68	O	O	C	O	O	O	C	C	O	O	O	O
69	C	O	O	O	O	O	C	C	O	O	O	O
70	C	C	C	C	C	C	O	C	O	O	O	O
71	O	O	C	C	C	C	O	C	O	O	O	O
72	C	O	O	C	C	C	O	C	O	O	O	O
73	C	C	C	O	C	C	O	C	O	O	O	O
74	O	O	C	O	C	C	O	C	O	O	O	O
75	O	C	O	O	C	C	O	C	O	O	O	O

Table Continued on Next Page

TABLE 1-4. SECTOR SELECT SWITCH SETTINGS (Contd)

Number of Sectors	Switch Number											
	0	1	2	3	4	5	6	7	8	9	10	11
76	C	C	C	C	O	C	O	C	O	O	O	O
77	C	O	C	C	O	C	O	C	O	O	O	O
78	C	C	O	C	O	C	O	C	O	O	O	O
79	C	O	O	C	O	C	O	C	O	O	O	O
80	C	C	C	O	O	C	O	C	O	O	O	O
81	O	O	C	O	O	C	O	C	O	O	O	O
82	O	C	O	O	O	C	O	C	O	O	O	O
83	O	O	O	O	O	C	O	C	O	O	O	O
84	C	C	C	C	C	O	O	C	O	O	O	O
85	C	O	C	C	C	O	O	C	O	O	O	O
86	C	C	O	C	C	O	O	C	O	O	O	O
87	C	O	O	C	C	O	O	C	O	O	O	O
88	C	C	C	O	C	O	O	C	O	O	O	O
89	O	C	C	O	C	O	O	C	O	O	O	O
90	O	O	C	O	C	O	O	C	O	O	O	O
91	O	C	O	O	C	O	O	C	O	O	O	O
92	C	O	O	O	C	O	O	C	O	O	O	O
93	C	C	C	C	O	O	O	C	O	O	O	O
94	C	O	C	C	O	O	O	C	O	O	O	O
95	O	O	C	C	O	O	O	C	O	O	O	O
96	C	C	O	C	O	O	O	C	O	O	O	O
97	C	O	O	C	O	O	O	C	O	O	O	O
98	O	O	O	C	O	O	O	C	O	O	O	O
99	O	C	C	O	O	O	O	C	O	O	O	O

Table Continued on Next Page

TABLE 1-4. SECTOR SELECT SWITCH SETTINGS (Contd)

Number of Sectors	Switch Number											
	0	1	2	3	4	5	6	7	8	9	10	11
100	C	O	C	O	O	O	O	C	O	O	O	O
101	O	O	C	O	O	O	O	C	O	O	O	O
102	O	C	O	O	O	O	O	C	O	O	O	O
103	C	O	O	O	O	O	O	C	O	O	O	O
104	O	O	O	O	O	O	O	C	O	O	O	O
105	C	C	C	C	C	C	C	O	O	O	O	O
106	C	O	C	C	C	C	C	O	O	O	O	O
107	O	O	C	C	C	C	C	O	O	O	O	O
108	C	C	O	C	C	C	C	O	O	O	O	O
109	O	C	O	C	C	C	C	O	O	O	O	O
110	C	O	O	C	C	C	C	O	O	O	O	O
111	O	O	O	C	C	C	C	O	O	O	O	O
112	C	C	C	O	C	C	C	O	O	O	O	O
113	C	O	C	O	C	C	C	O	O	O	O	O
114	O	O	C	O	C	C	C	O	O	O	O	O
115	C	C	O	O	C	C	C	O	O	O	O	O
116	O	C	O	O	C	C	C	O	O	O	O	O
117	C	O	O	O	C	C	C	O	O	O	O	O
118	O	O	O	O	C	C	C	O	O	O	O	O
119	C	C	C	C	O	C	C	O	O	O	O	O
120	C	C	C	C	O	C	C	O	O	O	O	O
121	O	C	C	C	O	C	C	O	O	O	O	O
122	C	O	C	C	O	C	C	O	O	O	O	O
123	O	O	C	C	O	C	C	O	O	O	O	O

Table Continued on Next Page

TABLE 1-4. SECTOR SELECT SWITCH SETTINGS (Contd)

Number of Sectors	Switch Number											
	0	1	2	3	4	5	6	7	8	9	10	11
124	C	C	O	C	O	C	C	O	O	O	O	O
125	O	C	O	C	O	C	C	O	O	O	O	O
126	C	O	O	C	O	C	C	O	O	O	O	O
127	O	O	O	C	O	C	C	O	O	O	O	O
128	O	O	O	C	O	C	C	O	O	O	O	O

Note: C = Closed or On position; O = Open or Off position.

NOTE

Ignore any remainder in the calculation. In most drives the existence of a remainder adds a "short" sector before index. However, in the BZ5A1V/W, BZ9A5E/F, and BZ9A1J/K/L/M, the final sector is extended to include the "short" sector.

Each sector switch represents a binary and decimal value of clock pulses (as counted in the logic). The values related to each switch are as follows:

<u>Switch No.</u>	<u>Binary Value</u>	<u>Decimal Value</u>
0	2 ⁰	1
1	2 ¹	2
2	2 ²	4
3	2 ³	8
4	2 ⁴	16
5	2 ⁵	32
6	2 ⁶	64
7	2 ⁷	128
8	2 ⁸	256
9	2 ⁹	512
10	2 ¹⁰	1024
11	2 ¹¹	2048

Here is an example of determining the switch settings for selecting 63 sectors:

$$\text{Total Sector Clock Pulses} = \frac{13\,440}{63} - 1 = 212$$

NOTE

Remainder is ignored.

Determine which switches to place in the Closed or On position as follows:

Total clock pulses per sector	212
Clock pulses selected by switch 7	128
(Difference)	84
Clock pulses selected by switch 6	64
(Difference)	20
Clock pulses selected by switch 4	16
(Difference)	4
Clock pulses selected by switch 2	4
(Difference)	0

Thus, placing switches 2, 4, 6, and 7 in the Closed or On position selects 63 sectors of 212 clock pulses per sector. Since a remainder existed in the calculation formula, an additional "short" sector of 21 Sector Clock Pulses (806 kHz) will be present just before index. In the BZ5A1V/W, BZ9A5E/F, and BZ9A1-J/K/L/M, the final sector is extended to include the 21 remaining Sector Clock Pulses.

CHECKOUT

GENERAL

After installation of the drive, perform visual inspection and verification and initial startup.

VISUAL INSPECTION AND VERIFICATION

Perform the following inspection after installing drive.

1. Verify that all logic cards are firmly seated in logic chassis, mini module, and power supply.
2. Verify that all connectors are firmly seated.
3. Verify that all cabling is intact and that there are no broken or damaged wires.

4. Inspect entire drive for the presence of foreign material which could cause an electrical short.
5. Verify that actuator is unlocked as in figure 1-11.
6. Verify that spindle is unlocked and that the ground spring portion of assembly is properly installed in the center of the shaft as in figure 1-12.
7. Confirm that drive belt is installed.

NOTE

For single channel operation, the single channel adapter plug must be installed and the dual channel steering card must be removed. Failure to remove card assembly disables the drive.

8. Verify, for single channel operation, that the single channel selector plug is installed on the wire wrap back-panel at location C04 between pins 15 and 36. Figure 1-22 shows the wiring configuration for the single channel adapter plug.

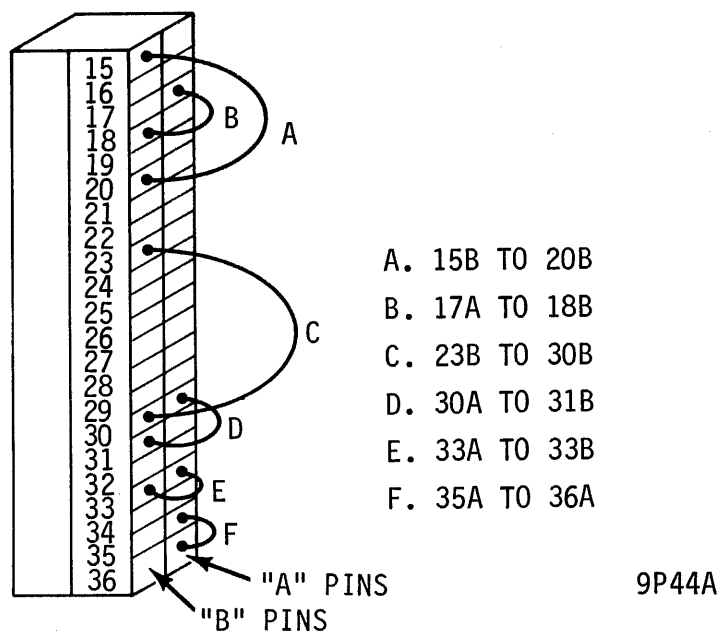


Figure 1-22. Single Channel Adapter Plug

9. Confirm that dual channel steering card assembly _FBX is removed from location C04.

NOTE

For dual channel operation, install dual channel steering card assembly and remove single channel adapter plug. Failure to remove adapter plug disables drive.

10. Verify, for dual channel operation, that dual channel steering card assembly _FBX is installed at location C04.
11. Confirm that single channel adapter plug is removed from wire wrap backpanel at location C04 between pins 15 and 36.

INITIAL STARTUP

After installation and visual inspection is completed, follow the sequence outlined below for initial startup. Refer to section 2 of the hardware reference manual for information about operation of the drive.

1. Set LOC/REM switch (on card assembly at B02/C02) to LOC position.
2. Set circuit breaker CBI at rear of drive in ON position and observe that the following events occur:
 - o The three fans on the front panel operate.
 - o The drive motor starts.
 - o The READY indicator lights within 30 seconds of start-up. This indicates that the drive motor is up to speed and that the heads are at track 0.

If any of these events do not occur, a problem exists in the drive. Then refer to the Decision Logic Tables in section 2C for troubleshooting information.

3. Power down drive.
4. Set LOC/REM switch to REM position if remote operation is desired.
5. Replace top and bottom covers.
6. Drive is now ready for online operation.

SECTION 2

MAINTENANCE

INTRODUCTION

This section provides the information necessary to maintain all configurations of the drive. The maintenance discussed in this section is limited to that which can be performed in the field. Unless otherwise specified, the information presented here applies to all equipments listed in the front of this manual.

The maintenance procedures defined here should be performed only by qualified maintenance personnel.

Information is divided into the following major areas:

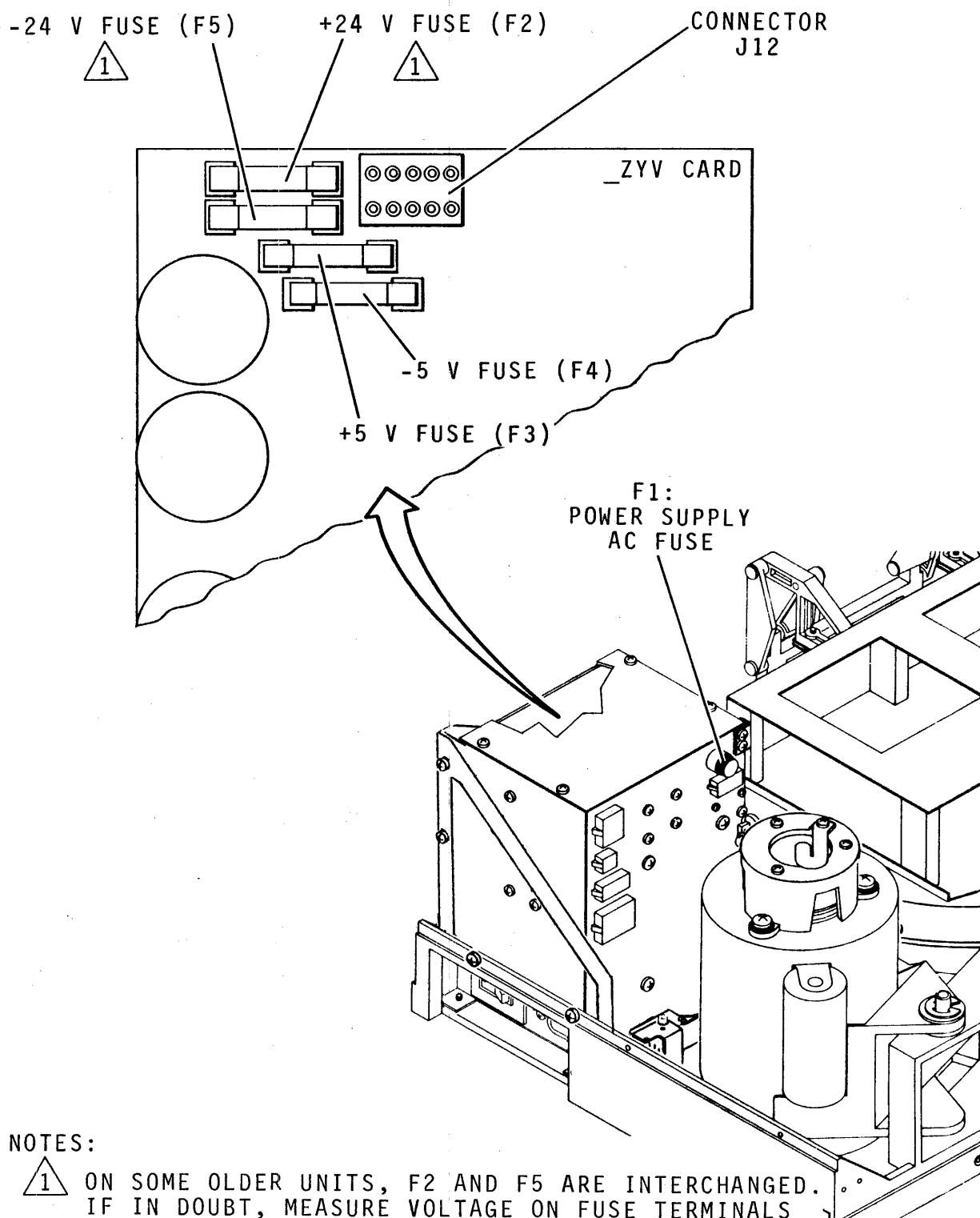
- General Maintenance Information - Provides information on safety precautions, maintenance tools and materials, special maintenance practices, accessing drive for maintenance, and test points. Before performing any maintenance, be thoroughly familiar with the information in this section.
- Tests and Adjustments - Provides procedures for all the major drive tests and adjustments which can be performed in the field.
- Trouble Analysis Information - Provides procedures and information to assist in isolating drive malfunctions.
- Repair and Replacement - Provides procedures and information on the replacement and adjustment of drive assemblies. This section assumes that the assembly was previously identified as malfunctioning.

8. Connect plugs AlP03, AlP02, AlP09, and AlP10 to power supply.
9. Perform Top Cover Replacement procedure.
10. Connect power cord to ac source and to power supply.

POWER SUPPLY REPAIR

Repair of the ZYV regulator card in the power supply is limited to fuse replacement. If one of the dc voltages is missing at its logic backpanel testpoint, perform the following steps:

1. Perform Top Cover Removal procedure.
2. Determine which dc voltage is missing.
3. Set circuit breaker CB1 in OFF position and disconnect drive from ac power.
4. Remove hardware securing cover to power supply and set cover aside.
5. Locate and replace suspected fuse. Figure 2-40 shows fuse locations. Fuse ratings are found in the logic diagram set. Removing plug P12 from regulator card makes lower fuses more accessible.
6. Apply power to drive and check dc voltages on logic backpanel. Procedures for checks and adjustments of these voltages are given in sections 2B and 2C.
7. Remove power from drive.
8. Replace cover on power supply with attaching hardware.
9. Perform Top Cover Replacement procedure.



NOTES:

1 ON SOME OLDER UNITS, F2 AND F5 ARE INTERCHANGED. IF IN DOUBT, MEASURE VOLTAGE ON FUSE TERMINALS TO DETERMINE CONFIGURATION.

9T268B

Figure 2-40. Power Supply Fuse Locations

SECTION 2A

GENERAL MAINTENANCE INFORMATION

GENERAL

This section contains general information relating to maintenance of the drive. A person performing maintenance on the drive should be familiar with this information in addition to the operating principles and procedures described in the hardware reference manual.

The information in this section is divided into the following areas:

- Safety Precautions - Lists safety precautions that must be observed when working on the drive.
- Maintenance Tools and Materials - Lists the tools and materials required to perform maintenance on the drive.
- Special Maintenance Practices - Presents important practices to be observed during field service.
- Physical Locations - Lists major assemblies of the drive with references to diagrams and parts data sections of the manual.
- Test Points - Identifies and describes the test points which are provided for maintenance purposes.
- Accessing Drive for Maintenance - Identifies the various parts of the drive and provides procedures which describe the opening and closing of the various parts of the machine in order to gain access for maintenance purposes.

SAFETY PRECAUTIONS

Observe the following safety precautions at all times. Failure to do so may cause equipment damage and/or personal injury.

- Use care while working with the ac power distribution and dc power supply because line voltages are present.
- Do not attempt to disassemble the mini module. It is not field repairable. Replace the entire mini module assembly if it is found defective.
- Do not operate the drive over an extended period of time without the top cover installed.

MAINTENANCE TOOLS AND MATERIALS

GENERAL

The maintenance procedures described in this manual require the use of certain special tools, test equipment, and materials. These are listed in table 2-1 along with the appropriate CDC part number. Note that the list only includes special tools. It is assumed that the service person has normal maintenance tools.

TABLE 2-1. MAINTENANCE TOOLS AND MATERIALS

Description	CDC Part Number
Card Extender (Full Size)	CDC 82318700
Card Extender (1/2 Size)	CDC 82318800
Chip Extender (Chip Clip)	CDC 12212196
Field Test Unit (TB216A)	CDC 75144000
Filter Coat	CDC 12210958
Non-Metallic Feeler Gage, 0.001 in	CDC 12205637
Non-Metallic Feeler Gage, 0.005 in	CDC 12205633
Oscilloscope, Dual Trace	Tektronix 475A or equivalent
Pin Straightener	CDC 87369400
Scope Probe Tip (Hatchet type)	CDC 12212885
Torque Wrench, 1/4 Inch	CDC 12263205
Table Continued on Next Page	

TABLE 2-1. MAINTENANCE TOOLS AND MATERIALS (Contd)

Description	CDC Part Number
Volt/ohmmeter	Ballantine 345 or equivalent digital volt- meter
Wire Wrap Removal Tool, 20-30 Gage	CDC 92020500
Wire Wrap Bit, 30 Gage	CDC 12218402
Wire Wrap Gun, Electric	CDC 12259111

Most of the items listed in the table require no explanation. The items listed in the table are called out in the specific procedures in which they are required. However, some of the items included in the list require further explanation. The field test unit is discussed under Special Maintenance Practices. The following paragraphs discuss the card extender and chip extender.

CARD EXTENDER

Two types of card extenders are required for maintaining the drive, one to accommodate the full size cards and the other for the half size cards. The extenders permit access to all components and test points on all cards except the NSN card. Since the NSN card cannot be extended, its components must be accessed from the foil side with the card in place.

When extending a card, always remove power from the drive before removing or installing the card.

Two considerations apply when extending the NRN and NQN cards located in front of the mini module. First, drive operation may be marginal when either card is extended. Second, to access these cards it is necessary to loosen the four screws securing the front panel brackets to the base frame and slide the front panel forward. The card retainer for these cards must be removed and set aside.

CHIP EXTENDER :

The chip extender clamps over the IC package, and the extended pins at the back of the clip serve as the desired test points.

SPECIAL MAINTENANCE PRACTICES

GENERAL

Normal drive maintenance is performed by using standard field service practices. Some important practices are presented below for emphasis.

TESTING THE DRIVE ;

General

Electrical testing of the drive requires that the drive be exercised. The drive may be exercised (commanded to perform various seeks or to read or write test data) by either a field test unit or by system software. Each method is discussed separately.

Field Test Unit . . .

The field test unit (FTU) makes it possible to exercise and evaluate a drive independent of the rest of the system. The drive operates offline because the FTU I/O cables are connected to the drive in place of the system I/O cables.

The FTU recommended for the MMD is the TB216A. The FTU manual contains specific instructions for interconnecting the FTU and the drive. The FTU manual also contains procedures for preliminary setup and operation of the tester.

Before disconnecting the system I/O cables from the drive, disable the controller and place drive circuit breaker CB1 in the OFF position. In a daisy chain system, power off all the drives. Remove all the system I/O cables from the drive to be tested. In a daisy chain system, make the necessary connections to ensure that other drives remain under system control, and restore power to the other drives.

Connect the FTU A cable to drive connector J3 and the FTU B cable to drive connector J2. Connect a terminator on drive connector J4 and make its ground connection. The terminator is shown in figure 1-19, and its part number is given in table 1-2. Drive connections are made on the A2A04 card for single

channel drives. Dual channel drives may be tested through the channel I or the channel II interface by making the three connections at the A2A04 card (channel I) or the A2B04 card (channel II).

At the completion of testing, restore the drive to online operation by reversing the process outlined above.

System Software

The drive may also be tested by use of microdiagnostic test routines (system software). This requires use of the controller and the appropriate software. In this type of testing, the drive communicates with the controller as in normal online operations, and no special I/O connections are necessary.

Refer to manuals or other documentation applicable to the specific system or subsystem for information concerning the system software routines.

HANDLING ELECTROSTATIC SENSITIVE DEVICES

The MMD uses logic cards having metal-oxide semiconductor integrated circuits. These circuits require special handling procedures to prevent damage from static electricity. Logic cards having metal-oxide semiconductor circuits are identified by orange card ejectors. Listed below are some precautions that service personnel must observe when handling these cards.

- Never use an ohmmeter on the _JBX microprocessor card assembly.
- Always remove the microprocessor card from the drive before using an ohmmeter on the drive.
- Turn off power before removing and installing any logic cards.
- Discharge to ground anything that will come in contact with the card. This includes tools, the body, clothing, containers, etc.
- Touch the logic chassis to bleed off any accumulated static charge before removing and installing the card, and continue to touch the chassis while removing and installing the card.
- Handle the card only by a non-circuit portion. Connector pins and circuit connection points must not be touched.

- Make sure that the special protective container for the card is in contact with the logic chassis ground before and during the time that the card is inserted into or removed from the container. The protective container must have affixed to it a CDC Warning Label, Form AA5642.
- Keep logic card in the approved container whenever it is not installed in the logic chassis or at a properly prepared work station.

PHYSICAL LOCATIONS

Figure 2-1 shows all the major assemblies in the drive and indicates the physical location code assigned to each. This is supplemented by the key to logic in the diagrams section which shows the location of all logic cards in the drive. Also, the illustrated parts breakdown in the parts data section is useful for locating parts inside the drive.

TEST POINTS

Test points are provided at the printed circuit card edges to aid service persons in carrying out maintenance of the system. The test points are of three types: plated holes, wire wrap posts, and turret terminals as shown in figure 2-2.

The plated hole test points are located at the card edge and are numbered left to right consecutively starting with test point 1 and continuing through test point 34 for the full size printed circuit card assembly. The half size card assembly usually has test points that are numbered 1 through 17, but this can vary for each type of card.

Wire wrap and turret test points may be located anywhere on the card assembly. These test points are assigned a four digit numerical X and Y coordinate location as XXYY and are so designated on the logic diagrams.

ACCESSING THE DRIVE FOR MAINTENANCE

GENERAL

The following instructions describe how to extend a rack-mounted drive on its slides and how to raise and lower the logic chassis. Instructions for removing the top, bottom, and rear covers, as well as the field-replaceable parts, are given in the repair and replacement section of this manual.

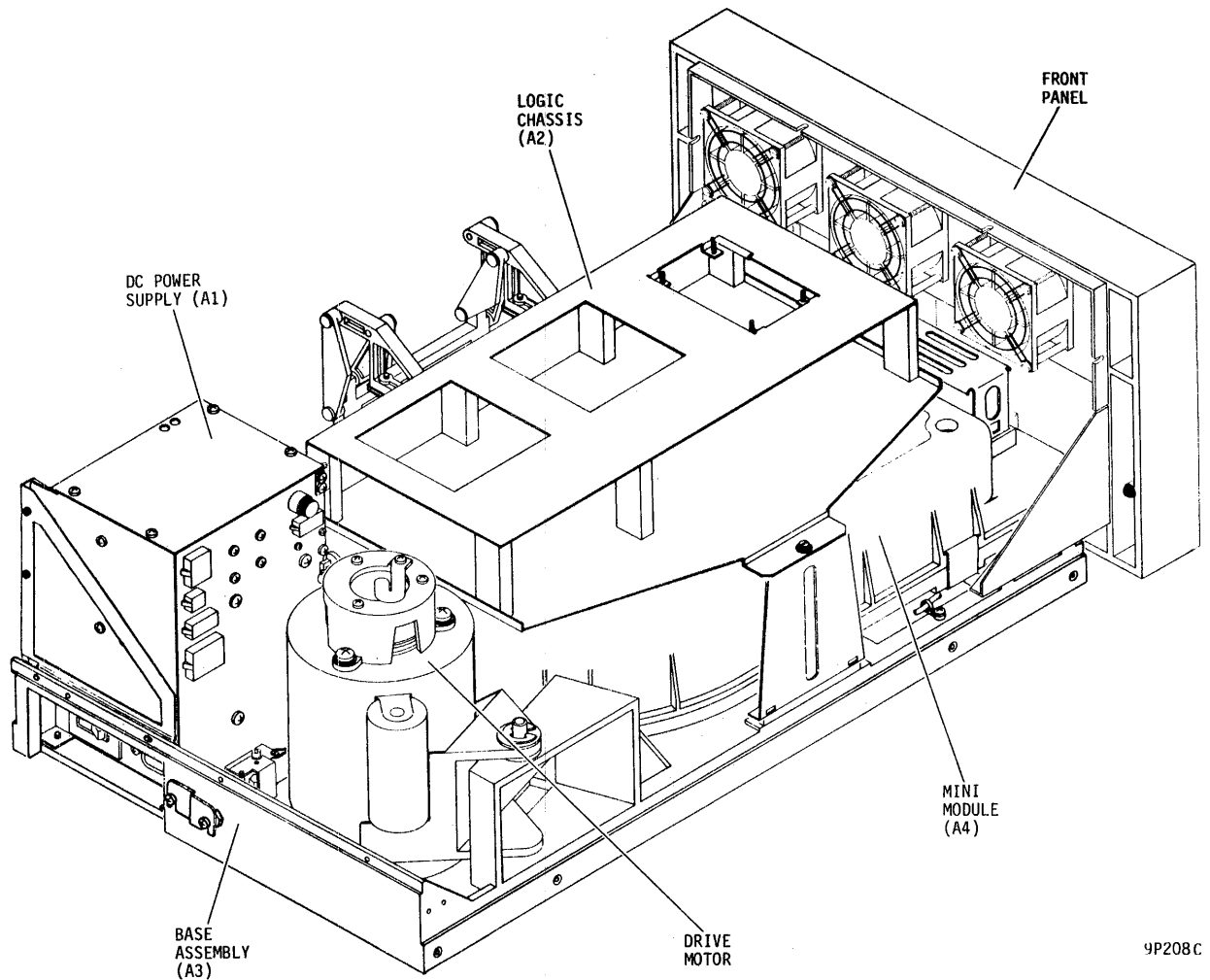


Figure 2-1. Assembly Location

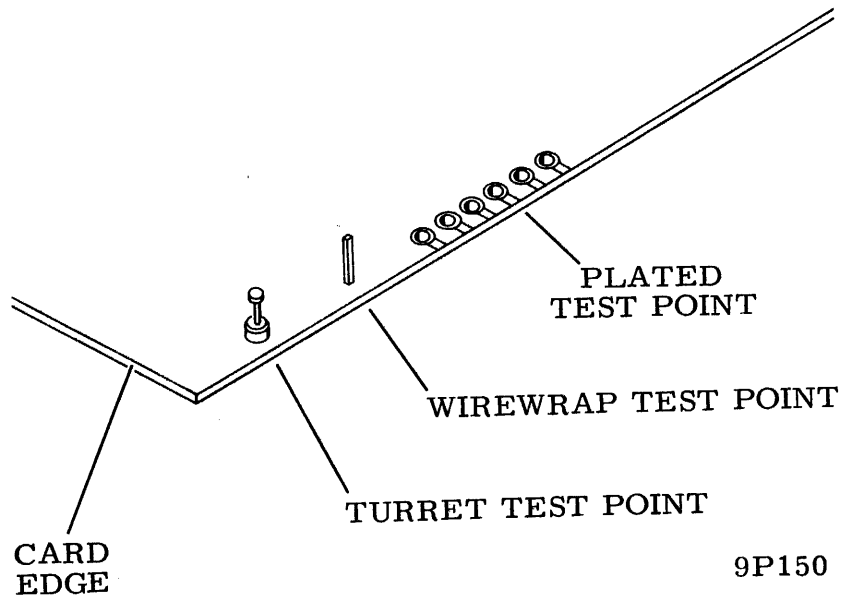


Figure 2-2. Types of Test Points

DRIVE EXTENSION

This procedure contains instructions for extending a rack-mounted drive for maintenance purposes. When extending a drive, exercise caution to ensure that the equipment rack remains stable. Also, take care that the system cabling is not damaged when sliding the drive in and out of the rack.

1. Remove front panel cover by pressing at top of cover until it snaps free.
2. Disengage latch on right side of front panel by inserting a 1/8 in allen wrench into hex screw on latch and turning wrench counterclockwise. Some drives also have a latch on left side of front panel; if so, disengage this latch in the same manner.
3. Pull out drive until full extension locks on slide assemblies are latched.
4. Perform desired maintenance.

5. Release full extension locks on slide assemblies and push drive into latched position in mounting rack.
6. Replace front panel cover by inserting top of cover first and then pushing bottom into place.

RAISING AND LOWERING THE LOGIC CHASSIS:

The two positions for the logic chassis are defined as follows:

- Normal operating - logic chassis is secured flat against mini module
- Maintenance - logic chassis is pivoted up 90° to expose top of mini module.

As shown in figure 2-3, the logic chassis is secured to the frame support by a 1/4-turn fastener on older drives and by a locking screw on newer drives. The following procedure describes raising the logic chassis to the maintenance position. Returning the logic chassis to the normal operating position is performed in the reverse order. This procedure assumes that power is removed from the drive.

1. Remove top cover of drive as defined in the removal procedure in this section of manual.
2. Remove I/O cable mount on rear cover.
3. On older drives, release 1/4-turn fastener securing logic chassis to frame support. On newer drives, remove and set aside the locking screw securing logic chassis to frame support.
4. Raise logic chassis to maintenance position.

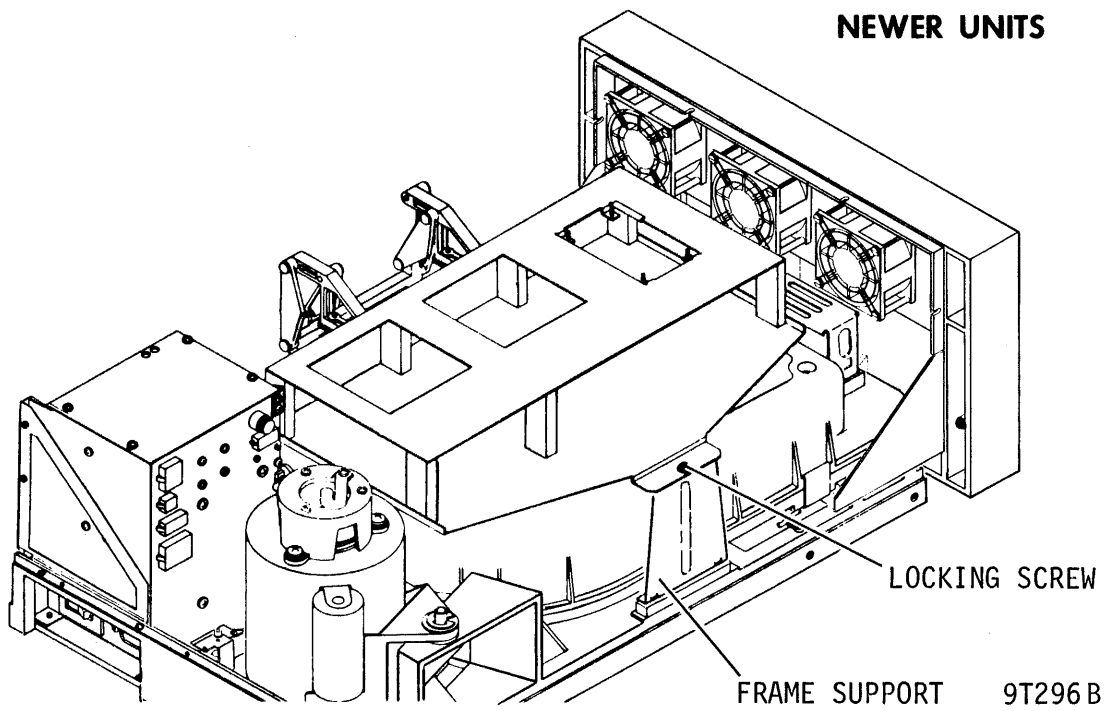
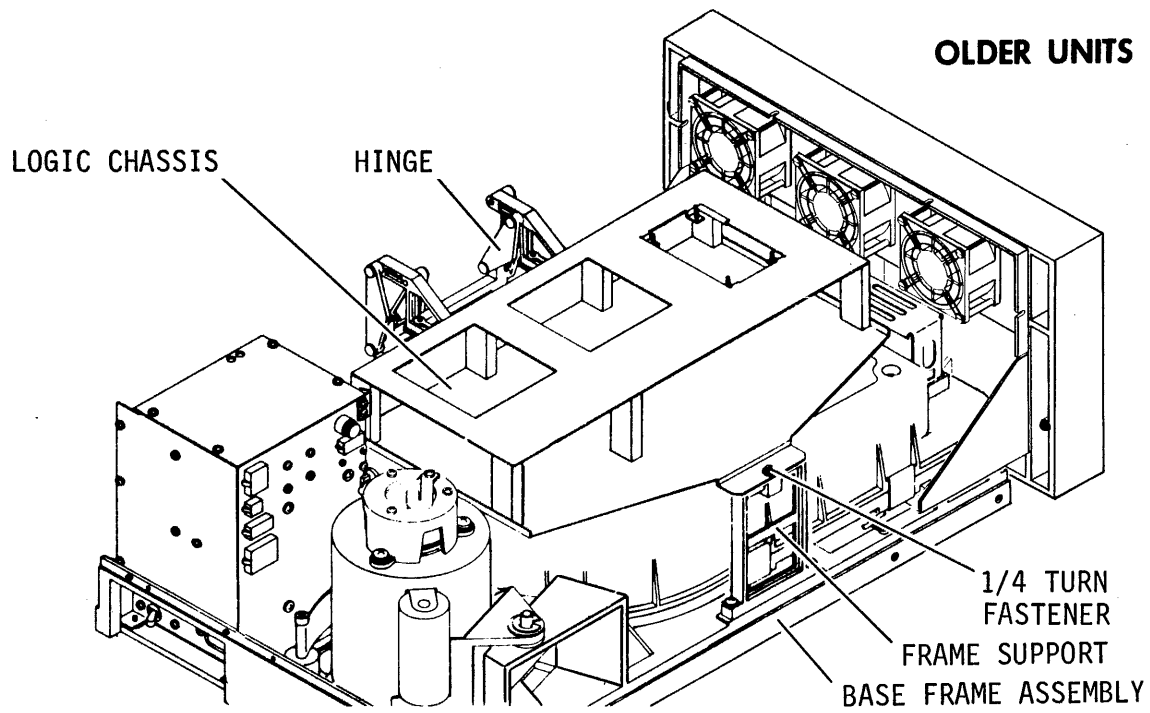


Figure 2-3. Logic Chassis

SECTION 2B

TESTS AND ADJUSTMENTS

TESTS AND ADJUSTMENTS

2B

GENERAL

This section provides information on the tests and adjustments which can be performed in the field. The adjustments given here are limited to those performed at the drive level. These tests should only be performed as required elsewhere in this manual, or when there is suspicion that the drive is not functioning properly.

Other tests, normally associated with analyzing a malfunction, are included in the Trouble Analysis section. A person performing these tests and adjustments should already be familiar with the information contained in the General Maintenance Information section. Refer to that section for information on safety precautions, maintenance tools and materials, and test point locations.

These procedures assume that an FTU is connected to the drive (or that suitable software is available), a mini module is installed, and the drive is powered on. All the following tests are written to provide a check procedure and then the adjustment. If the drive meets the criteria of the check, there is no need for the adjustment.

The following procedures are contained in this section, in the order specified:

- Plus and Minus 5 Volt Adjustment
- Servo Gain Adjustment
- Velocity Overshoot Adjustment
- Position Null Adjustment

PLUS AND MINUS 5 VOLT ADJUSTMENT

This procedure checks the output of the plus and minus 5 volt power supplies while the drive is doing repeat seeks. Power supply outputs are checked at the logic chassis backpanel. Therefore, the supplies are being checked to account for both line loss and loading.

1. Extend drive fully to the maintenance position.

2. Remove top cover. Refer to Top Cover Removal and Replacement procedure.
3. Connect digital voltohmmeter between GND and +5 V fastons on logic chassis wire wrap panel.
4. Command continuous seeks between cylinders 0 and 33 for 160 MB drives. For 80 MB drives, command continuous seeks between cylinders 0 and 66.

NOTE

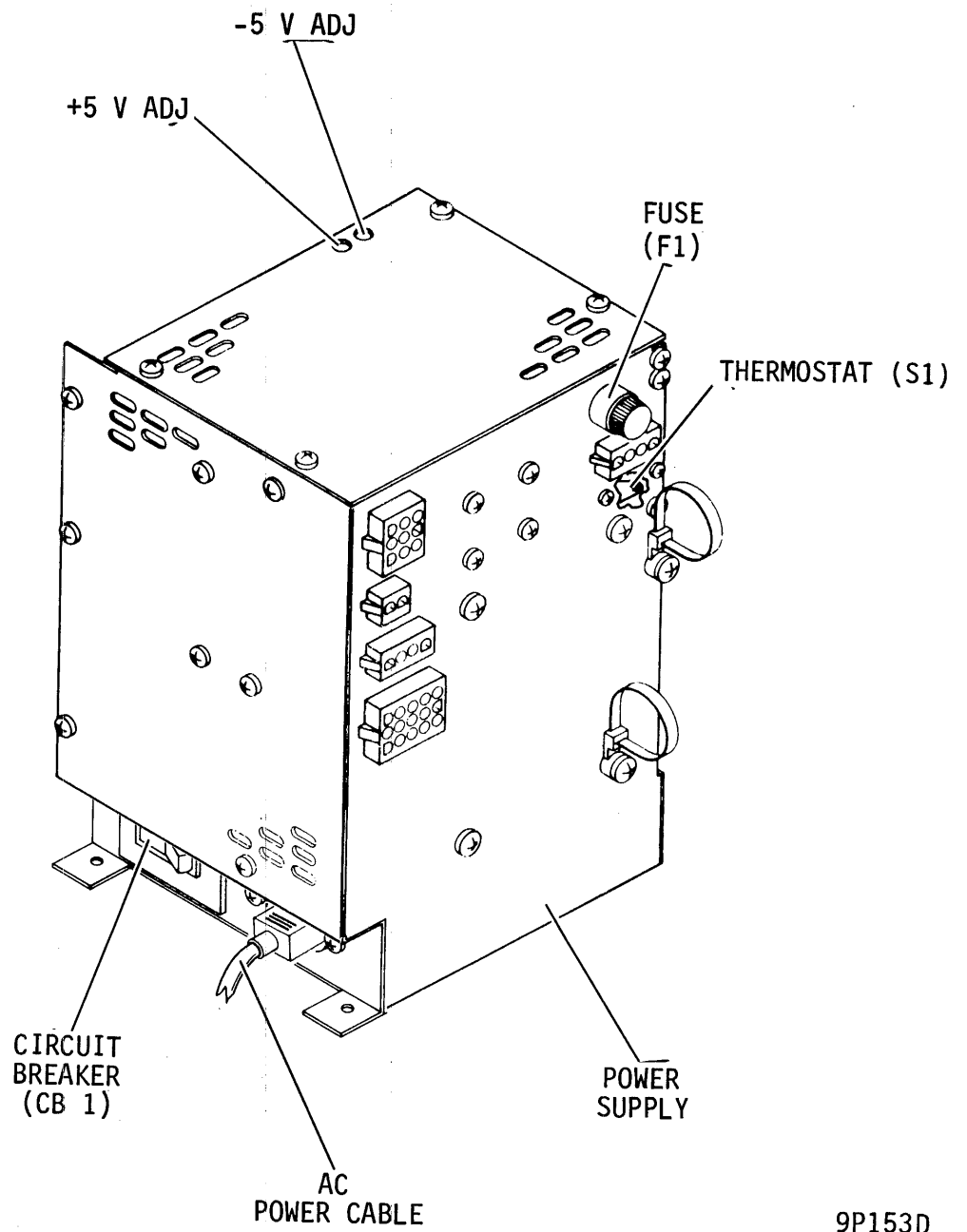
If +5 volt output is adjusted to exceed +5.7 volts, an overvoltage protection circuit reduces the output and holds it at about +1 volt. If this happens, remove power by turning off circuit breaker CBI, adjust +5 V potentiometer fully counterclockwise, and restore power with CBI before reattempting step 5.

5. Verify that +5 volt output is $+5.10 \pm 0.05$ volts. If not, adjust +5 V potentiometer on card assembly ZYV until output is within specification. Access is provided to the potentiometer through a hole in the top cover of the power supply as in figure 2-4.
6. Move voltohmmeter lead to -5 V faston on wire wrap panel.

NOTE

If -5 volt output is adjusted to exceed -5.7 volts, an overvoltage protection circuit reduces the output and holds it at about -1 volt. If this happens, remove power by turning off circuit breaker CBI, adjust -5 V potentiometer fully counterclockwise, and restore power with CBI before reattempting step 7.

7. Verify that -5 volt output is -5.10 ± 0.05 volts. If not, adjust -5 V potentiometer on card assembly ZYV until output is within specification.
8. Restore drive to normal operation when both power supply outputs are within specifications.



9P153D

Figure 2-4. Power Supply

SERVO GAIN ADJUSTMENT

If the analog card assembly _KBX or the mini module fails in the field, the following steps must be initiated to make certain that 8 volts peak to peak is available on the servo position signal as in figure 2-5.

1. Before installing replacement card in drive, using a voltohmmeter (VOM), adjust potentiometer SERVO GAIN ADJ (shown in figure 2-6) for the smallest resistance possible. Turn potentiometer counterclockwise.
2. Install _KBX card assembly into drive.
3. Apply power to drive.
4. Place LOC/REM switch to LOC position enabling disks to spin and unit to load heads.
5. Using the FTU, command 33 track continuous seeks for 160 MB drives or 66 track continuous seeks for 80 MB drives.
6. Connect oscilloscope as shown in figure 2-5.
7. Observe the +Position signal and adjust potentiometer SERVO GAIN ADJ shown in figure 2-6 for a position signal amplitude of 8.0 \pm 0.10 volts peak to peak.

OVERSHOOT ADJUSTMENT

This procedure contains instructions for minimizing access times by adjusting for optimum overshoot.

NOTE

Different criteria apply when adjusting different _KBX Analog Servo cards. Throughout this procedure, refer to Sheet 2 of figure 2-7 for the AJFX and A/C/E/G/H/M/NKBX cards, or to sheet 1 of figure 2-7 for other _KBX cards.

1. Connect oscilloscope as shown in figure 2-7.
2. Apply power to drive.
3. Command random seeks.
4. Observe +Position signal at TP17 on B01/C01 card assembly as shown in figure 2-7. Scope display shows traces for in and out direction seeks superimposed.

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	2.0 V/CM	B01-TP17	+POSITION
CH 2			

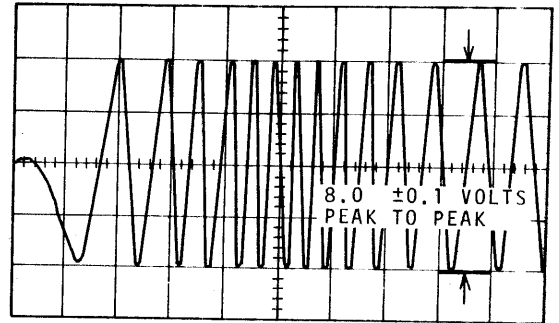
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
+EXT	B03-18B	+ IN DIRECTION

SCOPE GND TO GND ON LOGIC CARD.
USE XIO PROBES UNLESS OTHERWISE NOTED.

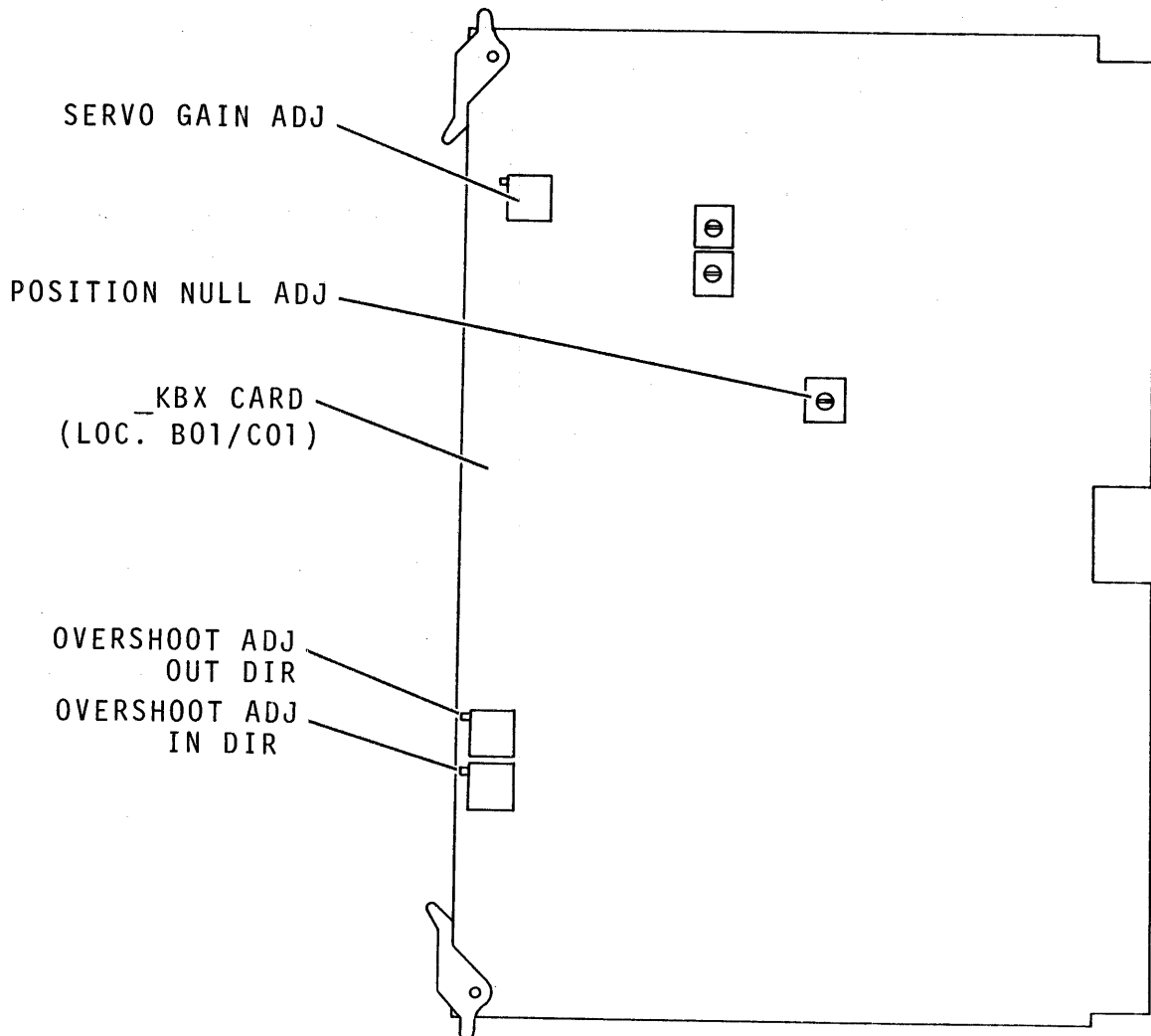
TIME/DIV: 1.0 ms/CM MODE: CH1

NOTES:



9P203F

Figure 2-5. Position Signal Gain



9T258

Figure 2-6. Servo Adjustment Potentiometer Locations

OSCILLOSCOPE SETUP

INPUT:			
CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	2 V/CM	B01-TP17	+POSITION
CH 2			
TRIGGERING:			
SLOPE/SOURCE		CONNECTION	SIGNAL NAME
-EXT		B03-18A	+INTEG SHORT

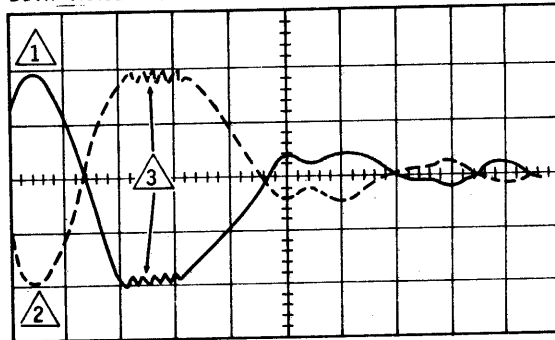
SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 1 MS/CM MODE: CH.1

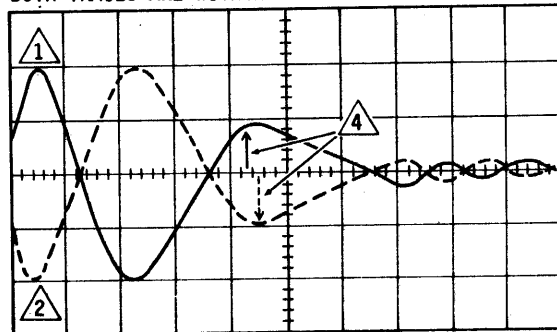
NOTES:

- ① SOLID-LINE TRACE PRODUCED BY IN DIRECTION SEEK
- ② DOTTED-LINE TRACE PRODUCED BY OUT DIRECTION SEEK
- ③ RIPPLES ON THESE PEAKS INDICATE THAT OVERSHOOT IS INSUFFICIENT
- ④ MAXIMUM ALLOWABLE OVERSHOOT IS 2.0 V-PEAK
- ⑤ OVERSHOOT EXCEEDS MAXIMUM ALLOWABLE VALUE

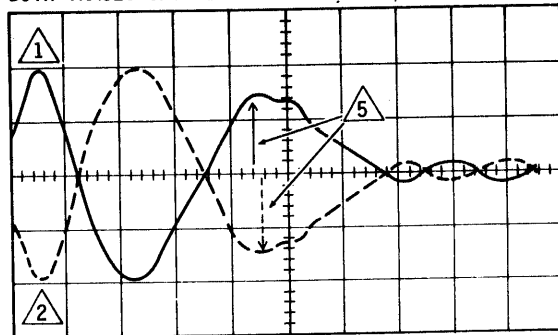
BOTH TRACES SHOW INSUFFICIENT OVERSHOOT:



BOTH TRACES ARE WITHIN TOLERANCE:



BOTH TRACES SHOW EXCESSIVE OVERSHOOT:



10K43

Figure 2-7. Overshoot (Sheet 1 of 2)

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	2 V/CM	B01-TP17	+POSITION
CH 2			

TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
-EXT	B03-18A	+INTEG SHORT

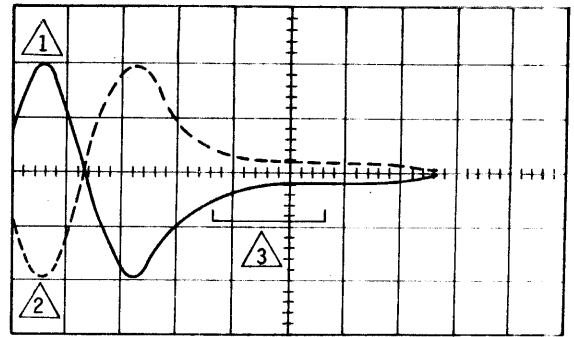
SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 1 MS/CM MODE: CH.1

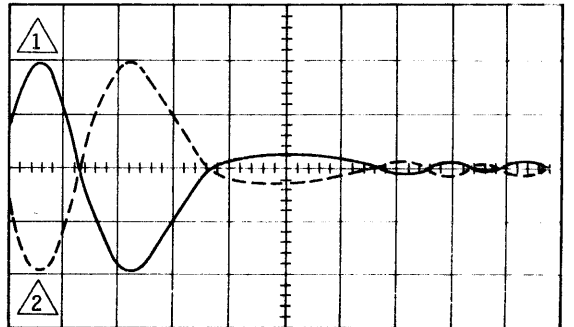
NOTES:

- ① SOLID-LINE TRACE PRODUCED BY IN DIRECTION SEEK
- ② DOTTED-LINE TRACE PRODUCED BY OUT DIRECTION SEEK
- ③ UNDERSHOOT IS INDICATED BY NO OSCILLATION IN THIS INTERVAL

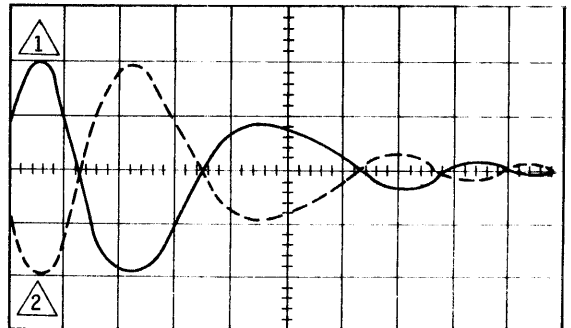
BOTH TRACES SHOW UNDERSHOOT:



BOTH TRACES ARE PROPERLY ADJUSTED:



BOTH TRACES SHOW EXCESSIVE OVERSHOOT:



10K42

Figure 2-7. Overshoot (Sheet 2)

NOTE

Card locations of potentiometers specified in steps 5 and 6 are shown in figure 2-6.

5. Adjust OVERSHOOT ADJ IN DIR potentiometer to optimize trace for in direction seeks (see figure 2-7).
6. Adjust OVERSHOOT ADJ OUT DIR potentiometer to optimize trace for out direction seeks (see figure 2-7).

POSITION NULL ADJUSTMENT

This procedure contains instructions for minimizing the offset error of the position signal when forward and reverse seeks are compared.

1. Connect oscilloscope as shown in figure 2-9.
2. Command 33 track continuous seeks for 160 MB drives or 66 track continuous seeks for 80 MB drives.
3. Observe the negative peaks of the +Position signal at B01-TP17 between forward and reverse seeks. Negative peaks should be within 0.4 volts of each other as shown in figure 2-9. If this requirement is not met, proceed with step 4. If it is met, skip to step 8.
4. Remove power from drive.
5. Place card B01/C01 on full size card extender.
6. Apply power to drive.
7. Adjust POSITION NULL potentiometer shown in figure 2-6 until above requirement is met.
8. Return drive to online operation.

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	2.0 V/CM	B01-TP17	+POSITION

CH 2

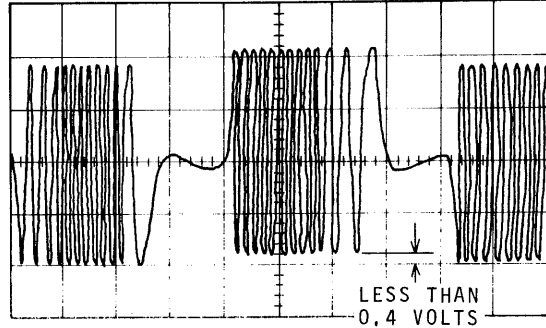
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
+EXT	B03-18B	+IN DIRECTION

SCOPE GND TO GND ON LOGIC CARD
USE XIO PROBES UNLESS OTHERWISE NOTED

TIME/DIV: 5ms/CM MODE: CH1

NOTES:



9PI98B

Figure 2-9. Position Signal

SECTION 2C

TROUBLE ANALYSIS INFORMATION

GENERAL

This section contains information on analyzing problems in the drive. The section is divided into three parts and they appear in the following order:

- Electrical Checks
- Troubleshooting Procedures
- Decision Logic Tables

The first part contains instructions on checking specific circuits or components. The last two parts describe procedures for localizing and correcting problems in the drive when their cause is not known.

The person performing these procedures should be thoroughly familiar with drive operation and with all information in the General Maintenance section of this manual.

ELECTRICAL CHECKS

GENERAL

The purpose of these procedures is to assist maintenance personnel in isolating problems causing improper drive operation. However, if the drive appears to be operating properly, failure to meet a specification given in these procedures does not in itself indicate improper drive operation.

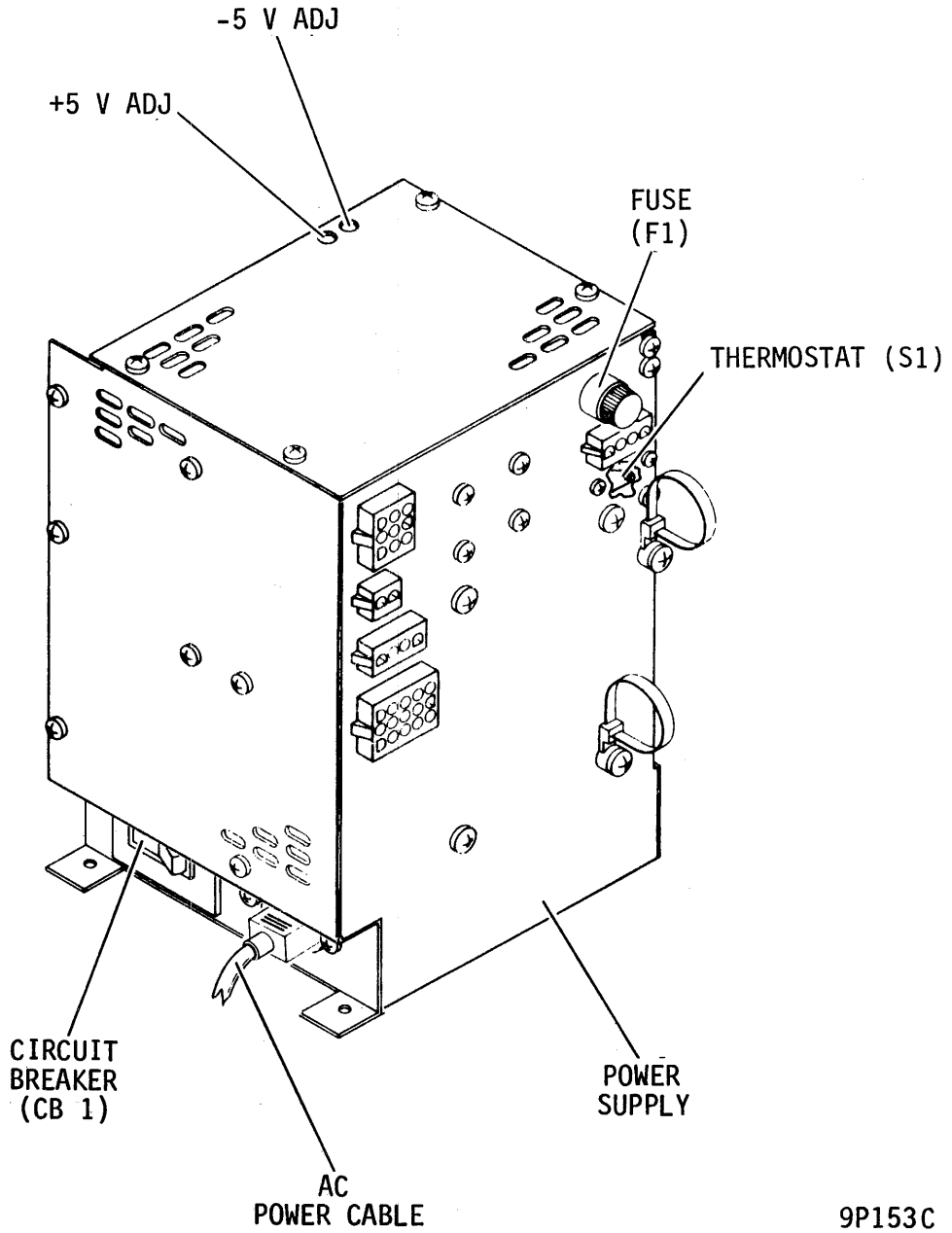
The procedures are divided into the following major areas:

- Power System Checks
- Servo System Checks
- Read/Write System Checks
- Miscellaneous Checks

POWER SYSTEM CHECKS

This procedure checks the ac and dc voltages. This includes all voltages except +5 volts and -5 volts which are checked in the Plus and Minus 5 Volt Adjustment procedure.

1. If drive fails to provide proper distribution of ac power, check circuit breaker (CBI) for ON position. Reset if necessary. Refer to figure 2-10 for circuit breaker location.
2. For further ac power distribution failures within drive, check fuse (F1) on the side of dc power supply. If blown, replace fuse with a fuse of the same specifications.
3. If an ac power failure continues to exist, check thermostat in power supply as shown in figure 2-10. Normally, the voltage drop across the thermostat is 0 V ac.
4. If drive motor fails to start, check thermo overload breaker on drive motor. Reset if necessary.
5. Prepare drive for use with test software or FTU.
6. Command continuous seeks between cylinders 0 and 128.
7. Connect voltmeter ground lead to ground terminal on wire-wrap panel.
8. Measure the following voltages at the test points on the logic chassis.
 - +24.0 \pm 2.4 volts at wire wrap panel +24 volt terminal.
 - -24.0 \pm 2.4 volts at wire wrap panel -24 volt terminal.
 - -8.2 \pm 0.4 volts at wire wrap panel B01-03A or B01-03B.
 - +15.0 \pm 0.75 volts at TP 3 on _KBX card assembly.
 - -15.0 \pm 0.75 volts at TP 2 on _KBX card assembly.
9. Referring to the Card Extender discussion in Section 2A, extend the _NRN card assembly.
10. Measure +18.0 \pm 1.08 volts at B3-43A or B3-43B on _NRN card assembly.



9P153C

Figure 2-10. AC Power

11. Replace the `_NRN` card assembly and extend the `_NQN` card assembly.
12. Measure the following voltages referenced to ground:
 - -18.0 ± 1.08 volts at A2-03A or A2-03B on `_NQN` card assembly.
 - $+6.0 \pm 0.3$ volts at B2-16A or B2-16B on `_NQN` card assembly.
 - -4.00 ± 0.25 volts at A2-33A or A2-33B on `_NQN` card assembly.
13. Return drive to online operation.

SERVO SYSTEM CHECKS

General

The servo system checks consist of procedures that test various points in the drives servo logic. It becomes very important to identify the area of failure between the mini module and the servo logic circuits, since a mini module should be replaced only upon failure.

These logic-controlled checks use the FTU or test software to command the actuator movement required for testing the servo system.

Position Gain Check

This procedure checks that the proper amplitude is available on the `+Position` signals. If necessary, perform the Servo Gain Adjustment in Section 2B before proceeding here.

1. Connect oscilloscope as shown in figure 2-11.
2. Command continuous seeks between cylinders 0 and 822.
3. Observe `+Position` signal at B01-TP17 over a complete seek. Its peak to peak amplitude must remain between 7.8 and 8.4 volts.
4. Connect oscilloscope as shown in figure 2-12.

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	2.0 V/CM	B01-TP17	+POSITION
CH 2			

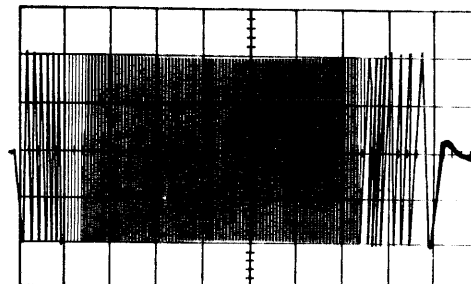
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
+EXT	B03-18B	+IN DIRECTION

SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 5 ms/CM MODE: CH 1

NOTES:



9T257

Figure 2-11. Plus Position Gain

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	2.0 V/CM	B01-TP16	-POSITION
CH 2			

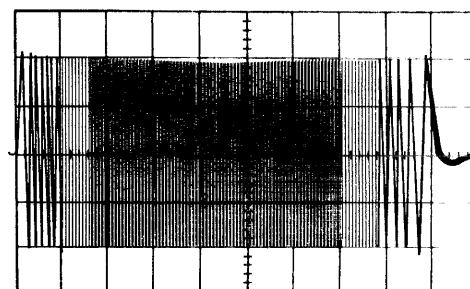
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
+EXT	B03-18B	+IN DIRECTION

SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 5 ms/CM MODE: CH.1

NOTES:



9T231

Figure 2-12. Minus Position Gain

5. Observe -Position signal at B01-TP16 over a complete seek. Its peak to peak amplitude must remain between 7.8 and 8.4 volts.
6. Return drive to online operation.

Position Demodulator Gating Check

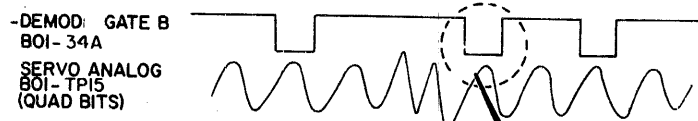
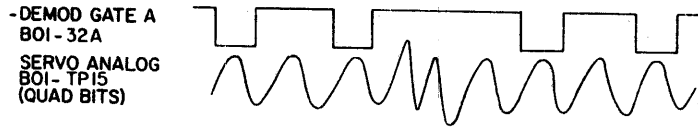
This procedure checks that the servo analog quadbits are centered within the demodulator gates.

1. Connect oscilloscope as follows:
 - TRIGGER: EXT+ at B02-TP27 (Index).
 - VOLTS/DIV: CH I 2.0 v/cm
CH II 0.5 v/cm
2. Command positioner to cylinder 0.
3. Connect CH I of oscilloscope to B01-32A (-Demod Gate A signal).
4. Connect CH II of oscilloscope to B01-TP15 (Servo Analog signal).
5. With oscilloscope in X10 magnified sweep, adjust horizontal position to display -Demod Gate A on CRT.
6. Measure quad bit gate timing as shown in figure 2-13.
7. Connect CH I of oscilloscope to B01-34A (-Demod Gate B signal).
8. With oscilloscope in X10 magnified sweep, adjust horizontal position to display -Demod Gate B on CRT.
9. Measure quad bit gate timing as shown in figure 2-13.
10. Return drive to online operation.

Settled On Track Delay Check

This procedure checks the on track delay to make certain the heads stay on track.

1. Connect oscilloscope as follows:



OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	2.0 V/CM	B01-32A	-DEMOD GATE A
CH 2	0.5 V/CM	B01-TP15	SERVO ANALOG

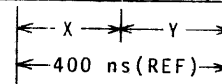
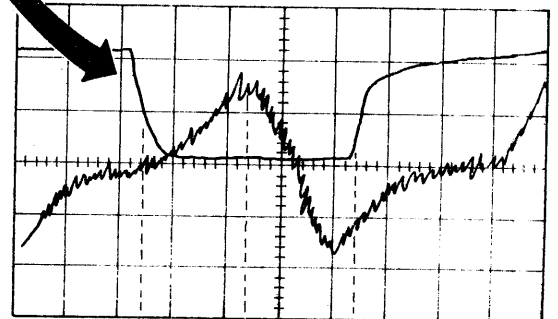
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
+EXT	B02-TP27	INDEX

SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 1 μ s/CM MODE: ALT

NOTES: PUT HORIZONTAL DISPLAY IN X10
DEMOD GATE SHALL BE CENTERED OVER
QUADBITS, WITHIN 100ns. (X=Y WITHIN 100ns)



9P204C

Figure 2-13. Demodulator Gating

- TRIGGER: EXT+ on C01-42A (+On Cylinder Sense)
 - VOLTS/DIV: 2.0 V/cm
 - TIME/DIV: 0.5 ms/cm
2. Command one cylinder continuous seeks for 160 MB drives or two cylinder continuous seeks for 80 MB drives.
 3. Connect CH I of oscilloscope to B03-21B (+On Cylinder).
 4. Observe that time interval between the start of the sweep and +On Cylinder condition is 2.5 ± 0.25 ms.
 5. Connect oscilloscope as follows:
 - TRIGGER: INT(CH I)
 - VOLTS/DIV: 2.0 V/cm
 - TIME/DIV: 20.0 μ s/cm
 6. Command continuous zero cylinder seeks.
 7. Observe that negative pulse period is 150 microseconds maximum.
 8. Return drive to online operation.

Cylinder Pulse Check

This procedure checks the delay on the one shots to make certain that a cylinder crossing pulse of sufficient width is generated.

1. Connect oscilloscope as shown in figure 2-14.
2. Command 14 cylinder continuous seeks.

NOTE

Verify that a jumper is installed between backpanel pins C01 - 30A and C01 - 30B for 80 MB drives.

3. Observe that +Position signal at B01-TP17 and Cylinder Pulse signal at C01-38A resemble those shown in figure 2-14.
4. Connect oscilloscope as follows:
 - TRIGGER: INT+ (NORM)

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	2.0 V/CM	B01-TP17	+POSITION
CH 2	2.0 V/CM	C01-38A	CYLINDER PULSE

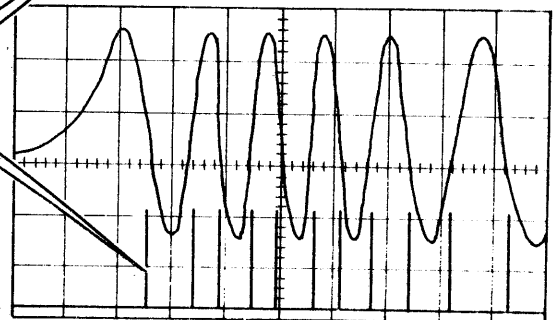
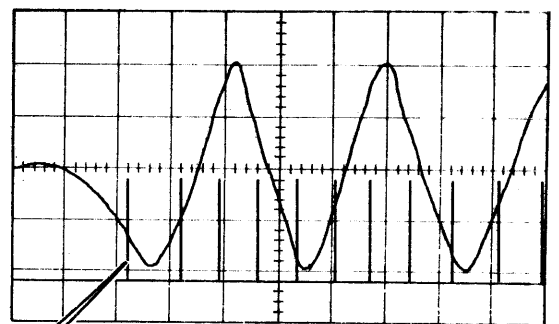
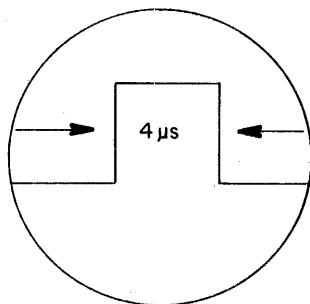
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
+EXT	B03-18B	+IN DIRECTION

SCOPE GND TO GND ON LOGIC CARD.
USE XIO PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 0.5ms/CM MODE: CHOPPED

NOTES:



9P188-1C

Figure 2-14. Cylinder Pulses

- TIME/DIV: 2 μ s/cm
 - MODE: CH II
5. Verify cylinder pulses are 4 ± 1 microseconds as in figure 2-14.
 6. Return drive to online operation.

On Track Level Detector Check:

This procedure checks the level detectors for the on track condition for both the plus and minus signals.

1. Connect oscilloscope as shown in figure 2-15.
2. Command three cylinder continuous seeks for 160 MB drives or six cylinder continuous seeks for 80 MB drives.

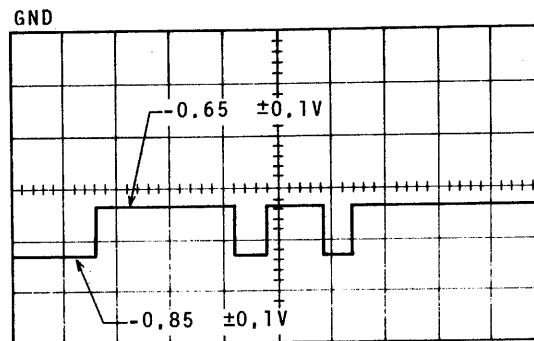
OSCILLOSCOPE SETUP

INPUT:			
CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	0.2 V/CM	B01-TP19	\pm POSITION 0.85V LEVEL DETECTOR
CH 2			
TRIGGERING:			
SLOPE/SOURCE		CONNECTION	SIGNAL NAME
+EXT		B03-18B	+IN DIRECTION

SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 0.5 ms/CM MODE: CH1

NOTES:



9P199B

Figure 2-15. Plus and Minus Level Detector Signal

3. Verify that switching levels for on track level detector are as shown in figure 2-15.
4. Return drive to online operation.

Linear Region Level Detector Check

This procedure checks the level detectors for the linear portion of the position signals.

1. Connect oscilloscope as shown in figure 2-16.
2. Command three cylinder continuous seeks for 160 MB drives or six cylinder continuous seeks for 80 MB drives.
3. Measure switching levels for linear region level detector as shown in figure 2-16.
4. Return drive to online operation.

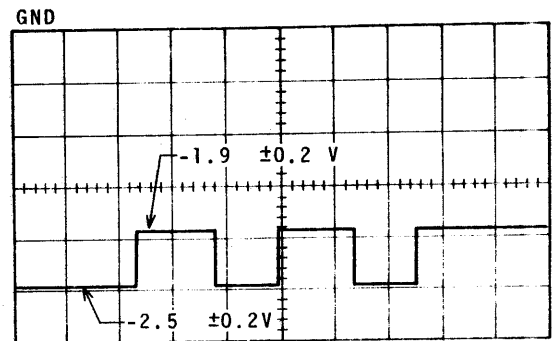
OSCILLOSCOPE SETUP

INPUT:			
CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	0.5 V/CM	B01-TP20	±POSITION 2.4 V LEVEL DETECTOR
CH 2			
TRIGGERING:			
SLOPE/SOURCE		CONNECTION	SIGNAL NAME
+EXT		B03-18B	+IN DIRECTION

SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 0.5 ms/CM MODE: CH1

NOTES:



9P200B

Figure 2-16. Plus and Minus Detector Signal

Track Crossing Level Detector Check

This procedure checks the track crossing level detector to make certain that the detector turns on at the proper level to set the track crossing latch.

1. Connect oscilloscope as shown in figure 2-17.
2. Command three cylinder continuous seeks for 160 MB drives or six cylinder continuous seeks for 80 MB drives.
3. Measure switching levels for track crossing level detector as shown in figure 2-17.
4. Return drive to online operation.

Current Sense Check

This procedure checks the current magnitude to make certain that the seek is completed in optimum time.

1. Connect oscilloscope as shown in figure 2-18.

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	0.2 V/CM	B01-TP27	±POSITION 0.85V LEVEL DETECTOR
CH 2			

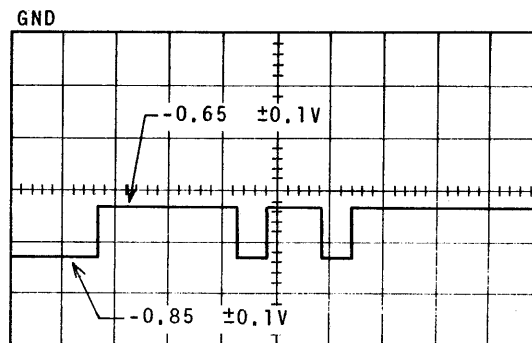
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
+EXT	B03-18B	+IN DIRECTION

SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 0.5 ms/CM MODE: CH1

NOTES:



9P201B

Figure 2-17. Plus Track Crossing Waveform

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	1.0 V/CM	B01-TP18	CURRENT SENSE
CH 2			

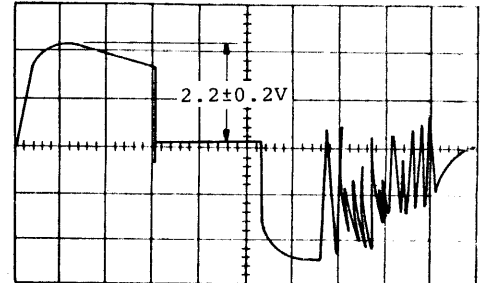
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
+EXT	B02-TP2	NOT ON CYLINDER

SCOPE GND TO GND ON LOGIC CARD.
USE XIO PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 5 ms/CM MODE: CH 1

NOTES:



9T232

Figure 2-18. Current Sense Waveform

2. Command 822 cylinder continuous seeks starting at cylinder 0.
3. Connect oscilloscope to B01-TP18 (Current Sense) and measure peak positive amplitude of the current sense signal. It should be 2.2 ± 0.2 volts.
4. Return drive to online operation.

Return To Zero Seek Timing Check

The performance of this procedure checks the time to perform the return to zero seek.

1. Connect oscilloscope as in figure 2-19.
2. Command several return to zero seeks and verify timing as shown in figure 2-19.
3. Return drive to online operation.

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	5.0 V/CM	B01-TP17	+POSITION
CH 2	2.0 V/CM	B02-29A	-GUARDBAND

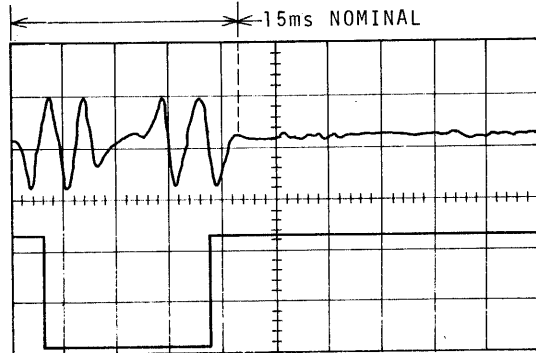
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
+EXT	B02-TP4	

SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 2.0 ms/CM MODE: CHOPPED

NOTES:



9P202B

Figure 2-19. Return to Zero Seek Timing

Speed Sensor Output Check

This checks the speed sensor output at full speed of 3600 revolutions per minute.

1. Connect oscilloscope as shown in figure 2-20.
2. Ensure that READY indicator is lit.
3. Observe that negative speed pulses have period of 16.67 (+0.4, -0.2) ms.
4. Return drive to online operation.

READ/WRITE SYSTEM CHECKS

Write Timing Check

This procedure checks the timing relationship between Write Clock and Write Data. Write Gate is used to trigger the oscilloscope. It is necessary to use a delayed sweep to observe the

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	2.0 V/CM	C01-12A	-SPEED PULSE
CH 2			

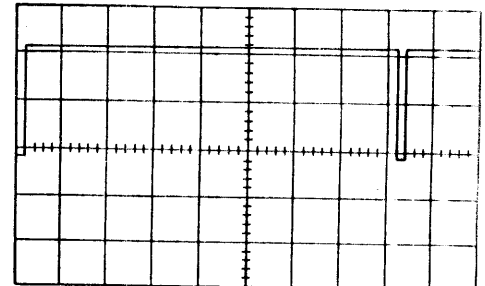
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
-INT		

SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

TIME/DIV: 2 ms/CM MODE: CH1

NOTES:



9T233

Figure 2-20. Speed Sensor Output

Write Data signal because address and sync fields appear between the transition of Write Gate and the start of the data pattern. Perform steps 1 through 4 to set up the oscilloscope and steps 5 through 8 to verify the timing of Write Data.

1. Command drive to write an alternate 1 and 0 pattern using cylinder 0, record 0, and head 0.
2. Connect oscilloscope as shown in figure 2-21.

NOTE

In "A Intensified" horizontal mode, the brightened marker highlights the segment of the sweep that is displayed later in "B Delayed" horizontal mode.

3. Adjust DELAY TIME MULTIPLIER on oscilloscope to move intensified marker into data pattern (refer to figure 2-21).
4. Referring to figure 2-22, position oscilloscope HORIZ DISPLAY switch to B DELAYED.
5. Observe that timing relationship between Write Data and Write Clock agrees with figure 2-22.
6. Connect oscilloscope as shown in figure 3-23.

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	1.0 V/CM	A01-08B	+WRITE DATA
CH 2	1.0 V/CM	A01-11B	+WRITE CLOCK

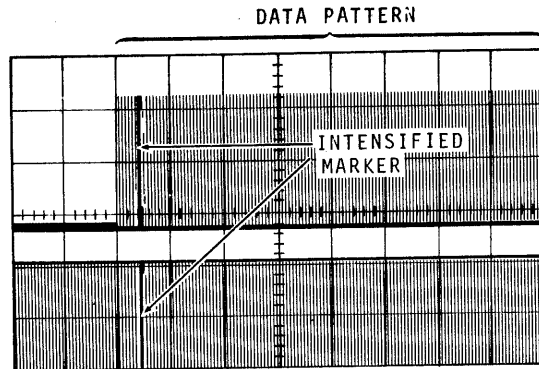
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
-EXT	A01-20B	-WRITE GATE

SCOPE GND TO GND ON LOGIC CARD.
USE XIO PROBES UNLESS OTHERWISE NOTED

A TIME/DIV: 5 μ s/CM MODE: ALT
B TIME/DIV: 50 ns/CM

NOTES: SET HORIZONTAL DISPLAY TO "A INTENSIFIED."
ADJUST DELAY TIME MULTIPLIER TO MOVE MARKER
INTO DATA PATTERN



9T234A

Figure 2-21. Scope Setup for Write Check

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	1.0 V/CM	A01-08B	+WRITE DATA
CH 2	1.0 V/CM	A01-11B	+WRITE CLOCK

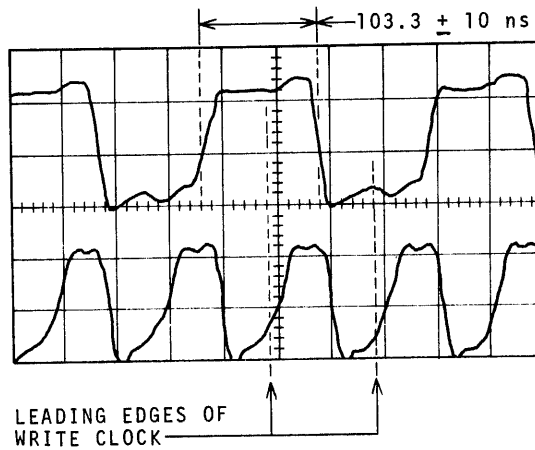
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
-EXT	A01-20B	-WRITE GATE

SCOPE GND TO GND ON LOGIC CARD.
USE XIO PROBES UNLESS OTHERWISE NOTED.

A TIME/DIV: 5 μ s/CM MODE: ALT
B TIME/DIV: 50 ns/CM

NOTES: SET HORIZONTAL DISPLAY TO B(Delayed).
ADJUST DELAY TIME MULTIPLIER AS
REQUIRED.



9P160A

Figure 2-22. Write Data Timing

7. Observe that +Compensated MFM Data pulses have pulse width indicated in figure 3-23.
8. Return drive to online operation.

Read Timing Check

This procedure checks the timing relationship between Read Clock and Read Data. Read Gate is used to trigger the oscilloscope. It is necessary to use a delayed sweep to observe the Read Data signal because address and sync fields appear between the transition of Read Gate and the start of the data pattern. Perform steps 1 through 5 to set up the oscilloscope and steps 6 and 7 to verify the timing of Read Data.

1. Perform Write Timing Check (previous procedure).
2. Command drive to read alternate 1 and 0 data pattern written in Write Timing Check. Use cylinder 0, record 0, and head 0.
3. Connect oscilloscope as shown in figure 2-24.

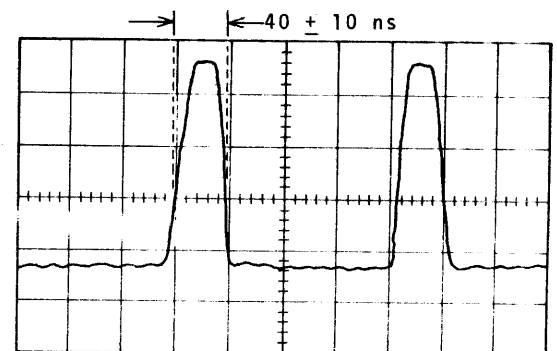
OSCILLOSCOPE SETUP

INPUT:			
CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	1.0 V/CM	A01-35B	+COMPENSATED MFM DATA
CH 2			
TRIGGERING:			
SLOPE/SOURCE		CONNECTION	SIGNAL NAME
- EXT		A01-20B	-WRITE GATE

SCOPE GND TO GND ON LOGIC CARD.
USE XIO PROBES UNLESS OTHERWISE NOTED.

A TIME/DIV: 5 μ s/CM MODE: CH1
B TIME/DIV: 50 ns/CM
DELAY TIME: 13.25 μ s

NOTES: SET HORIZONTAL DISPLAY TO B(Delayed).
ADJUST DELAY TIME MULTIPLIER AS
REQUIRED.



9P161B

Figure 2-23. Compensated MFM Data Waveform

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	2.0 V/CM	A03-27B	+READ DATA
CH 2	2.0 V/CM	A03-28B	-READ CLOCK

TRIGGERING:

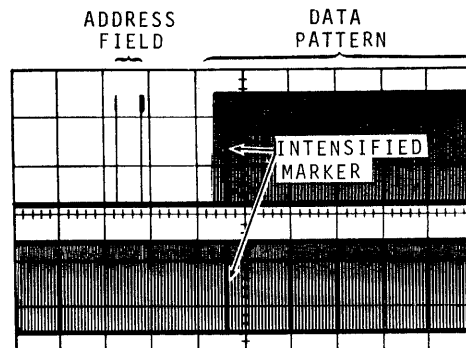
SLOPE/SOURCE	CONNECTION	SIGNAL NAME
-EXT	A04-04B	-READ GATE

SCOPE GND TO GND ON LOGIC CARD.
USE X10 PROBES UNLESS OTHERWISE NOTED.

A TIME/DIV: 10 μ s/CM MODE: ALT

B TIME/DIV: 50 ns/CM

NOTES: SET HORIZONTAL DISPLAY TO A INTENSIFIED.
ADJUST DELAY TIME MULTIPLIER TO MOVE MARKER
INTO DATA PATTERN.



9T235

Figure 2-24. Scope Setup for Read Check

NOTE

In "A Intensified" horizontal mode, the brightened marker highlights the segment of the sweep that is displayed later in "B Delayed" horizontal mode.

4. Adjust DELAY TIME MULTIPLIER on oscilloscope to move intensified marker into data pattern (refer to figure 2-24).
5. Referring to figure 2-25, position oscilloscope HORIZ DISPLAY switch to B DELAYED.
6. Observe that timing relationship between Read Data and Read Clock agrees with figure 2-25.
7. Return drive to online operation.

OSCILLOSCOPE SETUP

INPUT:

CHANNEL	VOLTS/DIV	CONNECTION	SIGNAL NAME
CH 1	2.0 V/CM	A03-27B	+READ DATA
CH 2	2.0 V/CM	A03-28B	-READ CLOCK

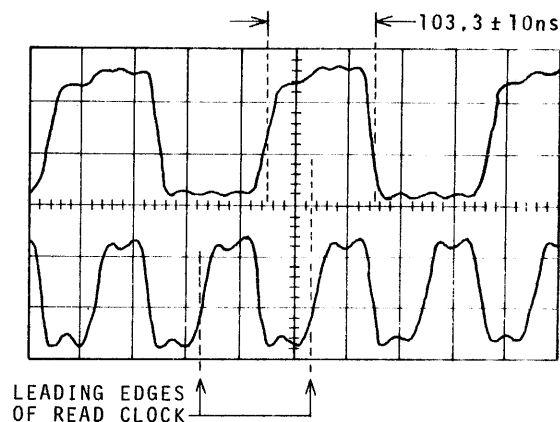
TRIGGERING:

SLOPE/SOURCE	CONNECTION	SIGNAL NAME
-EXT	A04-04B	-READ GATE

SCOPE GND TO GND ON LOGIC CARD.
USE XIO PROBES UNLESS OTHERWISE NOTED.

A TIME/DIV: 5 μ s/CM MODE: ALT
B TIME/DIV: 50 ns/CM

NOTES: SET HORIZONTAL DISPLAY TO B (DELAYED).
ADJUST DELAY TIME MULTIPLIER AS
REQUIRED.



9P162A

Figure 2-25. Read Data Timing

MISCELLANEOUS CHECKS

Power On Master Clear Check

This procedure checks the power on master clear circuit timing.

1. Connect oscilloscope as follows:

- TRIGGER: EXT+ at +5 Volts on terminal of wirewrap panel.
- VOLTS/DIV: 1.0 V/cm

2. Turn ac power off at rear of drive.

3. Connect oscilloscope to C02-31B (-DC Master Clear).

4. Turn on ac power at CB1 and verify that C02-31B is low for 4.0 \pm 1.5 seconds.

5. Disconnect oscilloscope and return drive to online operation.

Fault Code Display Check

This procedure checks that all segments of the LEDs in the fault code display are functional.

1. Turn on ac power at CBI at rear of drive.
2. Clear all fault counters by momentarily pressing the clear switch (S2) on the front of the unit.
3. Observe that display reads 000 with no defective LED segments.
4. Press status request switch (S1) and observe that display reads FFF with no defective LED segments.

TROUBLESHOOTING PROCEDURES

GENERAL

The following procedures specify how to pinpoint voltage faults in the logic chassis and read/write chassis and how to troubleshoot heat-generated problems in the drive. They are identified as Procedures A, B, and C and are referenced as such in the procedures entries in the heading blocks of the decision logic tables.

Figure 2-26, showing power and logic cabling, and table 2-2, identifying which dc voltages are used by each component, are included as general reference information.

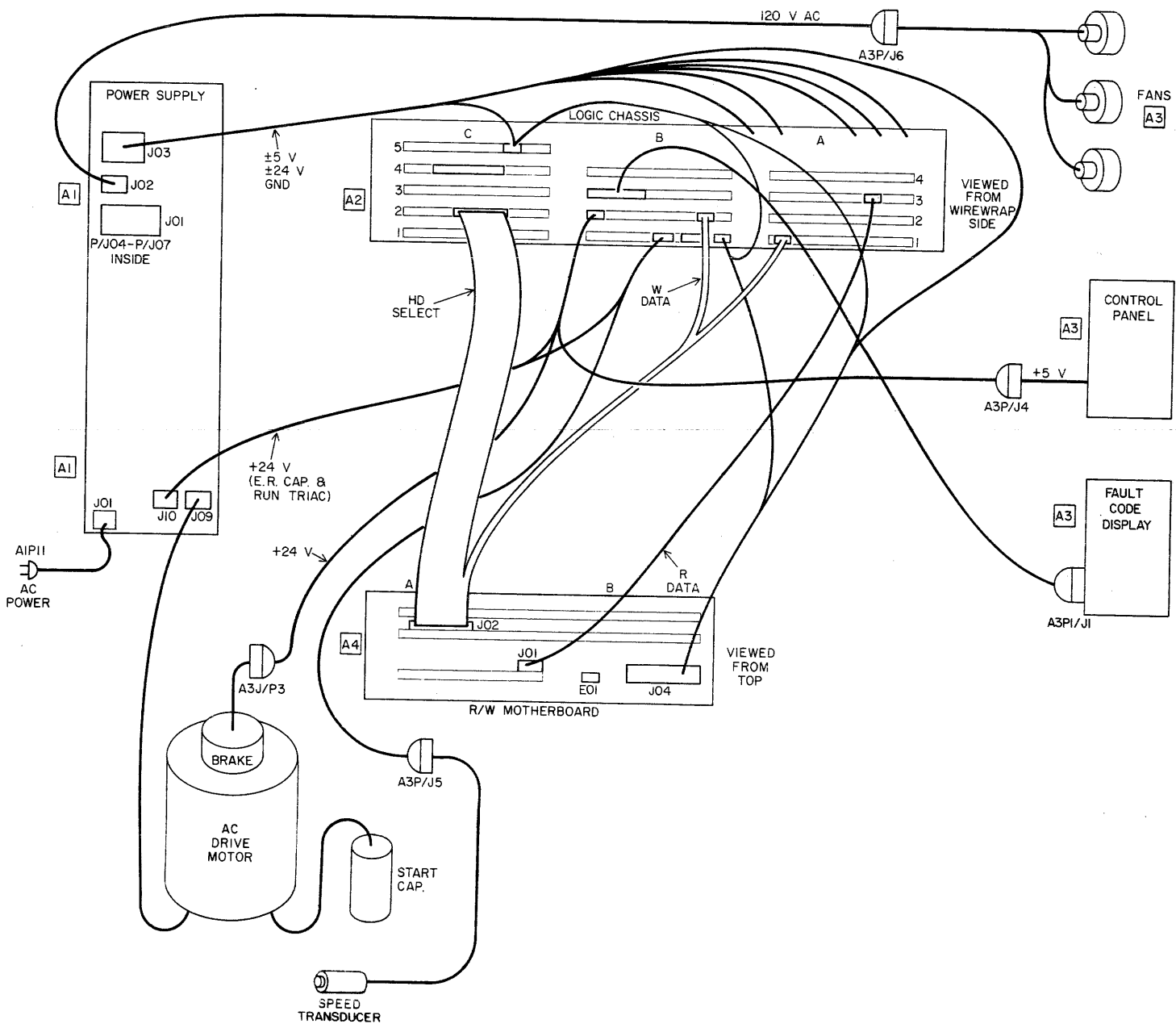


Figure 2-26. Power and Logic Cabling Between Assemblies

83323150 N

TABLE 2-2. DC VOLTAGES USED BY DRIVE COMPONENTS

Location or Component	-4 V	+5 V (44A,B)	-5 V (02A,B)	-8.2 V	+24 V (45A,B)	-24 V (01A,B)	Card Type
A1 Pwr Supply							
Run Triac					x		(via PB03)
Retract Cap					x		(via PB01)
A2 Logic Chassis							
A01		x	x		x		_FFX
A03		x	x				_FEX
A04		x	x				_FAX
B01/C01		x	x		x	x	_KBX
B02/C02		x			x		_FGX
B03		x					_JBX
B04		x	x				_FAX
C04		x	x				_FBX
C05					x	x	_ZSV
Table Continued on Next Page							

TABLE 2-2. DC VOLTAGES USED BY DRIVE COMPONENTS (Contd)

Location or Component	-4 V	+5 V (44A,B)	-5 V (02A,B)	-8.2 V	+24 V (45A,B)	-24 V (01A,B)	Card Type
A3 Base Assembly							
Brake					x		(via PB02)
Control Panel		x					(via PB02)
A4 Mini Module (1)							
A1			x			x	_NSN
A2/B2		x	x		x		_NQN
A3/B3		x	x		x		_NRN
A4 (mother-board)		x	x		x	x	_WJN
Servo Preamp				x (2)			
Fixed Head Shoe	x(3)	x	x				_YCN

- (1) All mini module voltages come from W/W pins at location B01 on logic chassis unless noted otherwise below.
- (2) -8.2 V is derived on KBX card in location A2B01/C01, and is available on pins 03A,B.
- (3) -4 V is derived on NQN card in location A4A2/B2, and is available on pins 20A,B and 33A,B.

PROCEDURE A: VOLTAGE FAULTS IN THE LOGIC CHASSIS

This procedure locates ± 5 V and ± 24 V faults on cards in the logic chassis or in the logic chassis backpanel wiring.

The test procedures may be conducted in either of two ways. The first method is to check the ± 15 V and ± 24 V loads individually by entering Procedure A from the applicable DLT:

± 5 V -- Condition 1 of DLT 3

± 24 V -- Condition 1 of DLT 4

The second method is to check both loads at the same time. The test for load faults in each voltage is made by adding cards to the logic chassis one at a time, so it is more efficient to check all loads on a given card at one time. (Of course, some cards will not require both checks). The second method is the one described below:

NOTE

It should be pointed out that, as shown in table A-1, only +5 V is used on every card. If there is no +5 V fault in the logic chassis (that is, when testing Condition 1 of DLT 3, F3 did not blow), only the cards using the faulted voltage(s) need to be removed.

1. Be certain to restrict the ± 5 V and ± 24 V distribution to the logic chassis, as described in both of the Conditions shown above.
2. Turn off the POWER circuit breaker.
3. Be certain that all four dc voltage wires, plus the two ground wires, are connected to the terminals on the logic chassis.
4. Remove all cards from the logic chassis. (See NOTE, above, for possible exception to this "all cards" rule).

5. Disconnect A2 PC/JC05 from amplifier card assembly _ZSV.
6. Turn on the POWER circuit breaker to energize the logic chassis; then, after a second or two, turn it off again.
7. Load faults caused by wiring errors in (or damage to) the logic chassis backpanel will show up as a blown fuse. If a fuse blows, carefully check backpanel for shorts caused by bent pins or dangling wires. After clearing the fault, replace blown fuse or fuses.
8. You are now ready to start putting the cards back in the logic chassis one at a time and connecting cable A2 PC/JC05 to power amplifier card assembly, checking for faults after each one has been inserted or connected.
9. Before inserting a card, examine both sides for evidence of arcing across the foil. Often the carbon residue around an arc area can be removed with an alcohol swab and the card will not give any more trouble.
10. Insert the selected card properly.
11. Turn on the POWER circuit breaker, then turn it off.
12. Using table 2-3 to determine which voltages are present on the card, check the integrity of the applicable fuses.
13. If step 12 shows a blown fuse, replace the card just installed with a fresh one from the spare parts bin and try the test again.
14. If step 12 shows that the fuses are OK, select another card and repeat steps 9 through 14.
15. When all cards have been checked good, return to the applicable "load fault" DLT to continue the dc-load check-out on the additional assemblies.

PROCEDURE B: VOLTAGE FAULTS IN THE R/W CHASSIS

This procedure locates ± 5 V and ± 24 V faults in cards A1, A2/B2, and A3/B3 of the card chassis on Mini Module assembly A4 (defined in this appendix as the R/W chassis), or in the etched-circuit wiring of the R/W chassis motherboard, location A4A4.

The test procedure may be conducted in either of two ways. The first method is to check the ± 5 V and ± 24 V (including -8.2 V input to the servo preamp) individually, by entering the procedure from the applicable DLT:

± 5 V -- Condition 1 of DLT 3 (Sheet 2)

± 24 V -- Condition 2 of DLT 4 (Sheet 2)

This second method is to check both loads at the same time. The test for load faults in each voltage is made by adding cards to the A4 motherboard one at a time, checking for faults after each insertion. For consistency with Procedure A, however, the second method is described.

NOTE

Before beginning the following procedure, be certain that prior Conditions of DLT 3 and DLT 4 have been tested. This ensures that the logic chassis, the Run triac, the brake, and the retract capacitor are free of voltage faults.

1. Turn off the POWER circuit breaker.
2. Be certain that all four dc voltage wires, plus the two ground wires, are connected to the terminals on the logic chassis.
3. Remove connecting cable A4P01 from the A1/B1 card. DO NOT remove connector P/J02 (flat cable) from A2/B2 card or connector P/J04 from the A4 motherboard.
4. Remove cards A1, A2/B2, and A3/B3 from the motherboard.
5. Ascertain that F5 (-24 V), F3 ($+5$ V), and F4 (-5 V) are all good. (The R/W chassis does not use $+24$ V).
6. Turn on the POWER circuit breaker to energize the motherboard; then, after a second or two, turn it off again.
7. Examine F3, F4, F5. If any fuses are blown, the fault is in the motherboard. This can only be cured by replacing the mini module, as described in section 2D. If the fuses are intact, go to step 8.
8. Select the A1 card removed in step 4. Before inserting it in the motherboard, examine both sides for evidence of arcing across the foil. Often the carbon residue around an arc area can be removed with an alcohol swab and the card will not give any more trouble.

9. Insert the selected card properly.
10. Turn on the POWER circuit breaker, then turn it off again.
11. Check the integrity of fuses F3, F4, and F5.
12. If step 11 shows a blown fuse, replace the card with a fresh one from the spare parts bin and try again.
13. If the fuses are intact, repeat steps 8 through 12 for the A2/B2 card.
14. If the fuses are intact, repeat steps 8 through 12 for the A3/B3 card.
15. When all three cards have checked out OK, replace cable A4P1 removed in step 3 and return to DLT 1.

PROCEDURE C: TROUBLESHOOTING HEAT-GENERATED PROBLEMS

Heat-related problems are easy to diagnose. They occur only when the drive gets hot, and they disappear when the drive has had a chance to cool off. If you suspect a problem is heat-related, let the drive cool down, then note the failure (or more accurately, the absence of the failure) when the drive is started up again. Often the troubleshooting period can be shortened by applying artificial heat to the suspected area (a hair dryer is useful here). Once you have diagnosed the problem, correct it as you would any other malfunction.

Heat problems are of two types -- those originating in the power supplies and those developing in the various loads. Should a load fault take out a fuse, the course is clear: Simply refer to the applicable "load" DLT. If the load does not blow a fuse but merely brings up a FAULT light (on the operator panel), the table below should offer a starting point for correcting the problem. (If the +5 V supply goes, of course, the fault light will not work).

<u>FAULT</u>	<u>PROBLEM RELATED TO</u>
Voltage (except +5 V)	B02/C02, B01/C01
On Cyl • (W+R)	B02/C02, B03, A01
Write	B02/C02, A04 (B04), A1, A2/B2
W•R	B02/C02, A04 (B04)
Hd Sel	B02/C02, A2/B2

DECISION LOGIC TABLES

GENERAL

This section contains decision logic tables (DLTs) designed to help the maintenance technician analyze problems occurring in the drive. For a given fault condition (or set of conditions), actions are recommended to locate and correct the fault. The corrective actions which are easier to perform (checking a fuse or changing a logic card, for example) are listed before the more difficult tasks such as replacing the drive motor.

This section consists of a discussion on using the DLTs and eight decision logic tables, described as follows:

- DLT 1 shows how to correct problems that occur while attempting to "power up" the drive, and defines any dc voltage problem as being either in the various "load" components or in the power supply itself.
- DLT 2 helps to correct problems within the power supply.
- DLTs 3 and 4 help to isolate voltage faults that appear in the ± 5 V and ± 24 V loads, respectively.
- DLT 5 helps to pinpoint the cause for the drive failing to go to a READY state during power-up.
- DLTs 6 through 8 are to be used in conjunction with the TB216 FTU to correct various seek and read/write errors.

USING THE DLT

The DLT is divided into four quadrants. The upper-left quadrant, CONDITIONS, contains the various test conditions that can be answered "yes" or "no". The CONDITIONS quadrant is prefaced by any ASSUMPTIONS (that is, preconditions) that must be observed if the test results are to be valid. Sometimes, prerequisite actions other than the ASSUMPTIONS must be taken before the test for a given condition is made. Such steps are included in the CONDITIONS quadrant. The yes (Y) or no (N) answers to each condition are shown in numbered columns in the topright Situations quadrant.

To use the DLT, first determine whether the result of a condition tested is Y or N. If two or more conditions exist simultaneously, look for a situations column that combines the appropriate Y-N answers for those conditions. A dash (-) in the top-right Situations quadrant means that the related Condition is not a factor in determining what actions are to be taken for that situation.

Next determine what action should be taken for a given test result (i.e., situation) by following down the selected column to the row marked "1" in the lower-right Sequence quadrant. (If there is only one recommended action for a given situation, an "X" appears instead of the "1"). The recommended action is then located by moving across to the lower-left ACTIONS quadrant. A dash in a column of the Sequence quadrant indicates that the related Action is not applicable.

After taking the first recommended action, repeat the test that gave rise to the situation. If the test results have not changed (same situation), try recommended action 2, and so on, being sure to repeat the test after each such action.

Column 1 is generally reserved for an "everything OK" situation. If a DLT requires more than one sheet, this "no problem" column is repeated on each sheet. Similarly, the last ACTION on each sheet is a recommendation to "call field support". Do not brood over your inadequacy if you reach this last entry; not every situation can be covered in a DLT.

Warning: None
Enters from: Assumptions
Procedures: Power Supply, Drive Motor Assembly, Speed Transducer Replacement (Sect. 2D)
References: Power and cabling diagrams 012, 022, 412.
Exits to: Sheet 2

Assumption:
 1. Sector switches set per customer's disk format.
 2. Drive connected to ac power and set for LOCAL operation.

CONDITIONS	1	2	3	4	5	6	7	8	9
1. Do fans start when circuit breaker CBl is turned on?	Y	Y	Y	Y	Y	Y	Y		
2. Does drive motor start when CBl is turned on?	Y	Y	Y	Y	N	N	N		
3. Does READY light come on a few seconds after power has been applied?	Y	N	N	N	-	-	-		
4. Does drive motor thermal breaker trip before drive gets up to speed?	-	Y	N	-	-	-	-		
5. Does drive motor stop after 15-second start timeout expires?	-	-	Y	N	-	-	-		
6. Is -Ready signal (approx 0 V) present at B02-43A on logic chassis backpanel?	-	-	-	Y	-	-	-		
7. Is ac line voltage present between pins 3 and 1 of AlJ09 (power for drive motor start winding)?	-	-	-	-	Y	N	N		
8. Is ac line voltage present between pins 4 and 1 of AlJ09 (power for drive motor run winding)?	-	-	-	-	Y	N	Y		
9. Are ±24 volts present at logic chassis terminals?	-	-	-	-	Y	Y	Y		
10. Are ±5 volts present at logic chassis terminals?	-	-	-	-	Y	Y	Y		
ACTIONS	1	2	3	4	5	6	7	8	9
1. Power Up completed satisfactorily. Go to DLT 6.	X	-	-	-	-	-	-		
2. Check brake coil continuity thru pins on A3J3.	-	1	-	-	-	-	-		
3. Replace _FGX card (Fault/Control) at A2B02/C02.	-	2	2	-	-	1	-		
4. Replace _JBX card (Microprocessor Control) at A2B03.	-	3	-	-	-	2	-		
5. Replace drive motor assembly.	-	4	-	-	2	-	-		
6. Replace motor start triac (AlK1) in power supply.	-	5	-	-	-	4	1		
7. Replace _KBX card (Analog Servo) at A2B01/C01.	-	-	1	-	-	-	-		
8. Check speed transducer alignment. Replace transducer if necessary.	-	-	3	-	-	-	-		
9. Troubleshoot READY indicator for bad indicator or open wiring.	-	-	-	X	-	-	-		
10. Ensure that motor thermal breaker is closed (reset).	-	-	-	-	1	-	-		
11. Replace motor run triac (AlK2) in power supply.	-	-	-	-	-	3	-		
12. Replace _ZYV card in power supply.	-	-	-	-	-	5	2		
13. Go to conditions on sheet 2.	-	6	4	-	-	-	-		
14. Call Field Support.	-	-	-	-	3	6	3		

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DLT 4 ISOLATING FAULTS IN THE +24 VOLT LOADS

(Sheet 1 of 2)

Warning: None
Enters from: DLT 1 or as required.
Procedures: A; B; Power Supply Repair
References: Logic Diagrams
Exits to: DLT 4, Sheet 2

Assumption: Either F2 (+24 V) or F5 (-24 V) or both have blown, indicating a fault in the +24 V loads. Supplies are OK, measuring 24 ± 2.4 V. Begin each Condition below by turning off circuit breaker CB1 and ensuring that both F2 and F5 are good.

CONDITIONS	1	2	3	4	5	6	7	8	9
1. Restrict ±24 V loads to logic chassis (assy A2):									
a. Remove power supply wires from ±5 V connections on A2 backpanel.									
b. Remove A2PB01 and A2PB02 from pins on A2 backpanel.									
c. Remove connections from A2 backpanel carrying ±24 V to R/W chassis (A4).									
d. Remove A2PC05 from power amplifier (-2SV card).									
e. Turn on circuit breaker CB1. Did F2 or F5 blow?	Y	N	-	-	-	-			
2. Add run triac to +24 V load:									
a. Separate A3P3 and A3J3 (to brake coil).									
b. Reinstall A2PB02 on pins of A2 backpanel.									
c. Turn on circuit breaker CB1. Did F2 blow?	-	-	Y	N	-	-			
3. Add brake coil to +24 V load:									
a. Reconnect A3P3 and A3J3.									
b. Turn on circuit breaker CB1. Did F2 blow?	-	-	-	-	Y	N			

ACTIONS	1	2	3	4	5	6	7	8	9
1. Problem is in logic chassis. Replace fuses and go to Procedure A.	1	-	-	-	-	-			
2. Go to Condition 2.	-	X	-	-	-	-			
3. Check -ZYV assy in power supply for shorts.	-	-	1	-	-	-			
4. Check run triac and cabling for shorts or grounds.	-	-	2	-	-	-			
5. Go to Condition 3.	-	-	-	X	-	-			
6. Check brake and cabling for shorts or grounds.	-	-	-	-	1	-			
7. Go to Condition 1 on sheet 2.	-	-	-	-	-	X			
8. Call Field Support.	2	-	3	-	2	-			

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DLT 5 FIRST SEEK

Warning: None
Enters from: DLT 1
Procedures: None
References: Section 3 of Hardware Reference Manual gives waveform for servo quadbits.
Exits to: DLT 6 when seek problem is corrected.

Assumption: When unit is powered up, READY indicator does not come on. This indicates a failure to do a first seek to track 0. Electromechanical parts were checked in DLT 1, pointing to a problem in the logic or in the mini module.

CONDITIONS		1	2	3	4	5	6	7	8	9
1. Are quadbits present at output of B01/C01 card (pin B01-31A)?		Y	N	-	-					
2. After corrective actions, does READY indicator come on a few seconds after power is applied?		-	-	Y	N					

ACTIONS		1	2	3	4	5	6	7	8	9
1. Replace <u>-</u> KBX card (Analog Servo) at A2B01/C01.		1	1	-	-					
2. Replace <u>-</u> FFX card (Write PLO) at A2A01.		2	-	-	-					
3. Replace <u>-</u> FGX card (Fault/Control) at A2B02/C02.		3	-	-	-					
4. Replace <u>-</u> ZSV card (Power Amp) at A2C05.		4	2	-	-					
5. Replace <u>-</u> JBX card (Microprocessor Control) at A2B03.		5	-	-	-					
6. Replace the mini module.		6	3	-	-					
7. Replace the cable between A2PB01 and A4J04.		-	4	-	-					
8. Go to DLT 6.		-	-	X	-					
9. Call Field Support.		-	-	-	X					

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SECTION 2D

REPAIR AND REPLACEMENT

INTRODUCTION

This section provides all necessary information needed to perform the adjustment, removal, and replacement of field replaceable parts of the drive. If an adjustment procedure is included, and if there is some doubt as to the need for replacement, the adjustment procedure should be attempted before the final decision to replace the part is made.

Information included in this section assumes that the reader is thoroughly familiar with the General Maintenance section of this manual. In addition to the information presented in this section, the reader will find that the illustrations in the parts data section are very useful.

If the drive is slide mounted, most procedures can be performed with the drive extended from its normal operating position (in line with other drives or in an equipment rack). If the drive is mounted in a fixed position, it will be necessary to remove the drive to perform maintenance.

Repair is limited to the removal and replacement of the various assemblies and parts of the drive, and to the adjustment of those components. The illustrations show all the field replaceable parts of the drive, and their relationship to one another. The following procedures are included in the order stated:

- Entire Drive Removal and Replacement
- Slide Rails Removal and Replacement
- Top Cover Removal and Replacement
- Bottom Cover Removal and Replacement
- Rear Cover Removal and Replacement
- Front Panel Removal and Replacement
- Fan Removal and Replacement
- Primary Filter Removal and Replacement

- Drive Belt Removal and Replacement
- Motor Static Spring Removal and Replacement
- Spindle Ground Spring Removal and Replacement
- Logic Chassis Removal and Replacement
- Logic Chassis Hinge Removal and Replacement
- Mini Module Removal and Replacement
- Drive Motor Removal and Replacement
- Drive Motor Brake Removal and Replacement
- Speed Sensor Removal and Replacement
- Power Supply Removal and Replacement
- Power Supply Repair

All procedures in this section require that power to the drive be turned off and that assemblies be accessible.

After completing any of these procedures, perform the Checkout procedure given in section 1 of this manual.

ENTIRE DRIVE REMOVAL AND REPLACEMENT

This procedure contains instructions for removing the drive from its rack for maintenance purposes and reinstalling it later. Two people are needed for lifting the drive off and onto the slide rails.

When removing a defective drive and replacing it with another drive from the factory, refer to section 1 of this manual for information about packaging, unpackaging and installation information.

REMOVAL

1. Disconnect drive from ac power by unplugging power cord from ac source.
2. Extend drive fully to maintenance position.
3. Perform Top Cover Removal procedure.
4. Disconnect I/O cables from card assemblies of the logic chassis. Remove I/O cable mounts and detach I/O cables from drive.
5. Remove ground cable at rear of drive.

6. Perform Top Cover Replacement procedure.
7. Loosen and lower slide assembly catch on each J bracket (see figure 1-7).
8. Lift drive slightly and slide forward until J bracket clears J bracket catch at rear of each slide rail.

NOTE

Step 9 requires two people.

9. Lift drive straight up and remove.

REPLACEMENT

NOTE

Step 1 requires two people.

1. Lift replacement drive onto fully extended slide rails, making certain that J brackets slide beneath J bracket catches at rear of slide rails. Ensure that mounting stop on underside of each J bracket fits into mounting notch on each outer slide. Figure 1-8 shows slide mounting sequence.
2. Position 90-degree tabs of each slide assembly catch firmly against each outer slide and tighten their adjustment nuts. This secures MMD on the slide assemblies.
3. Perform Top Cover Removal procedure.
4. Install all I/O cables as described under System Cabling in section 1 of this manual.
5. Install ground cable at rear of drive as described under System Grounding in section 1 of this manual.
6. Install line terminators as required. Refer to System Cabling discussion in section 1 of this manual.
7. Return drive to operating position in mounting rack.
8. Plug drive into source ac power.
9. Return drive to online operation.

SLIDE RAILS REMOVAL AND REPLACEMENT

This procedure is limited to replacement of a defective slide rail. Two people are needed for lifting the drive off and onto the slide rails. Information about initial installation of slide rails in a rack is given in section 1 of this manual.

REMOVAL

1. Perform Entire Drive Removal procedure.
2. Loosen hardware attaching defective slide rail to rack.
3. Remove slide rail.

REPLACEMENT

1. Remove J bracket from replacement slide rail and return with defective slide rail. See figure 1-7.
2. Loosen adjusting screws on front and rear recess brackets such that slide assembly can be positioned in rack.
3. Position slide assembly in rack and tighten hardware securing slide assembly to rack.
4. Tighten adjusting screws on recess brackets.
5. Ensure that slide rail assemblies are aligned horizontally and vertically, and that assemblies are parallel.
6. Perform Entire Drive Replacement procedure.

TOP COVER REMOVAL AND REPLACEMENT

This procedure applies either to replacement of a defective top cover or to temporary removal of the top cover to access other components in the drive.

REMOVAL

1. Extend drive fully to maintenance position.
2. Place circuit breaker CBl in OFF position and disconnect power cord at drive or ac source.
3. Remove screws securing top cover to drive.
4. Remove top cover.

REPLACEMENT

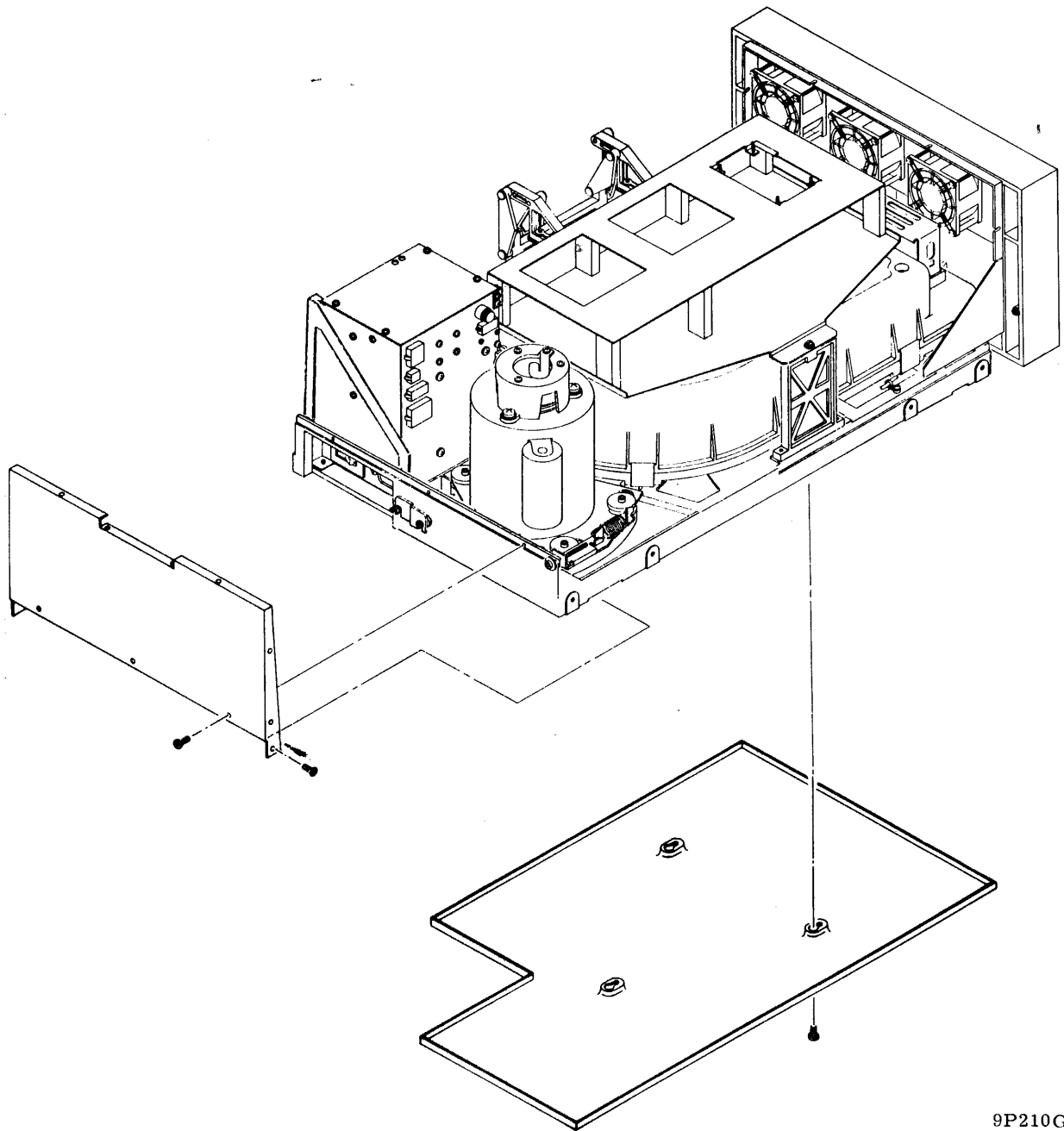
1. Place top cover over drive and align holes in cover with screw holes.
2. Replace screws to hold top cover to base frame.
3. Restore power to drive.
4. Return drive to operating position in mounting rack.
5. Return drive to online operation.

BOTTOM COVER REMOVAL AND REPLACEMENT

This procedure applies either to replacement of a defective bottom cover or to temporary removal of the bottom cover to access other components in the drive.

REMOVAL

1. Extend drive fully to maintenance position.
2. Place circuit breaker CBI in OFF position and disconnect power cord at drive or ac source.
3. Loosen screws securing bottom cover to base frame as shown in figure 2-27.
4. Slide cover toward front of drive until screws align with enlarged holes in cover. Lower cover until cover clears base of unit.
5. Remove bottom cover.



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Figure 2-27. Bottom Cover

REPLACEMENT

1. Ensure that vinyl closures are installed on mini module studs to prevent bottom cover from contacting studs.
2. Align enlarged holes in bottom cover with screws in base frame. Raise cover allowing screws to pass through holes and then slide cover toward rear of drive.
3. Tighten screws securing bottom cover to base frame.
4. Restore power to drive.
5. Return drive to operating position in mounting rack.
6. Return drive to online operation.

REAR COVER REMOVAL AND REPLACEMENT

This procedure applies either to replacement of a defective rear cover or to temporary removal of the rear cover to access other components in the drive.

It is difficult to remove the rear cover without removing the drive from the rack; therefore, two people are needed for lifting the drive off and onto the slide rails.

REMOVAL

1. Perform Entire Drive Removal procedure.

NOTE

On older drives, it may be necessary to remove J brackets to remove screws attaching rear cover to sides of drive.

2. Remove screws at base of rear cover.
3. Remove rear cover.

REPLACEMENT

1. Install replacement rear cover into position on base frame.
2. Replace screws at base of rear cover. On each side of drive, use only the rear hole if more than one is available.
3. Perform Entire Drive Replacement procedure.

FRONT PANEL ASSEMBLY REMOVAL AND REPLACEMENT

REMOVAL

1. Perform Top Cover Removal procedure.
2. Disconnect plug A3P6 (at left side of drive as viewed from the front).
3. Loosen screws attaching each front panel gusset to base frame (see figure 2-28) and slide front panel assembly as far as possible from base frame.
4. Disconnect plug A3P4 (at right side of drive as viewed from the front).
5. Remove ground strap connected to fan mounting plate or to fans from base frame (if present).
6. Remove front panel cover by pressing at top of cover until it snaps free.
7. Disconnect plug A3P1 from _DZV display assembly.
8. Remove screws attaching each front panel gusset to base frame as shown in figure 2-28.
9. Remove front panel assembly.

REPLACEMENT

1. Align front panel gussets with screw holes in base frame.
2. Loosely install screws with flat and lock washers through gussets securing front panel assembly to base frame.
3. Connect plug A3P4 (at right side of drive as viewed from the front).
4. Connect plug A3P6 (at left side of drive as viewed from the front).
5. Connect plug A3P1 to _DZV display assembly.
6. Reattach ground strap (connected to fan mounting plate or fans in some drives) to base frame.
7. Slide front panel assembly as far as possible toward base frame.
8. Tighten screws through front panel gussets.
9. Perform Top Cover Replacement procedure.

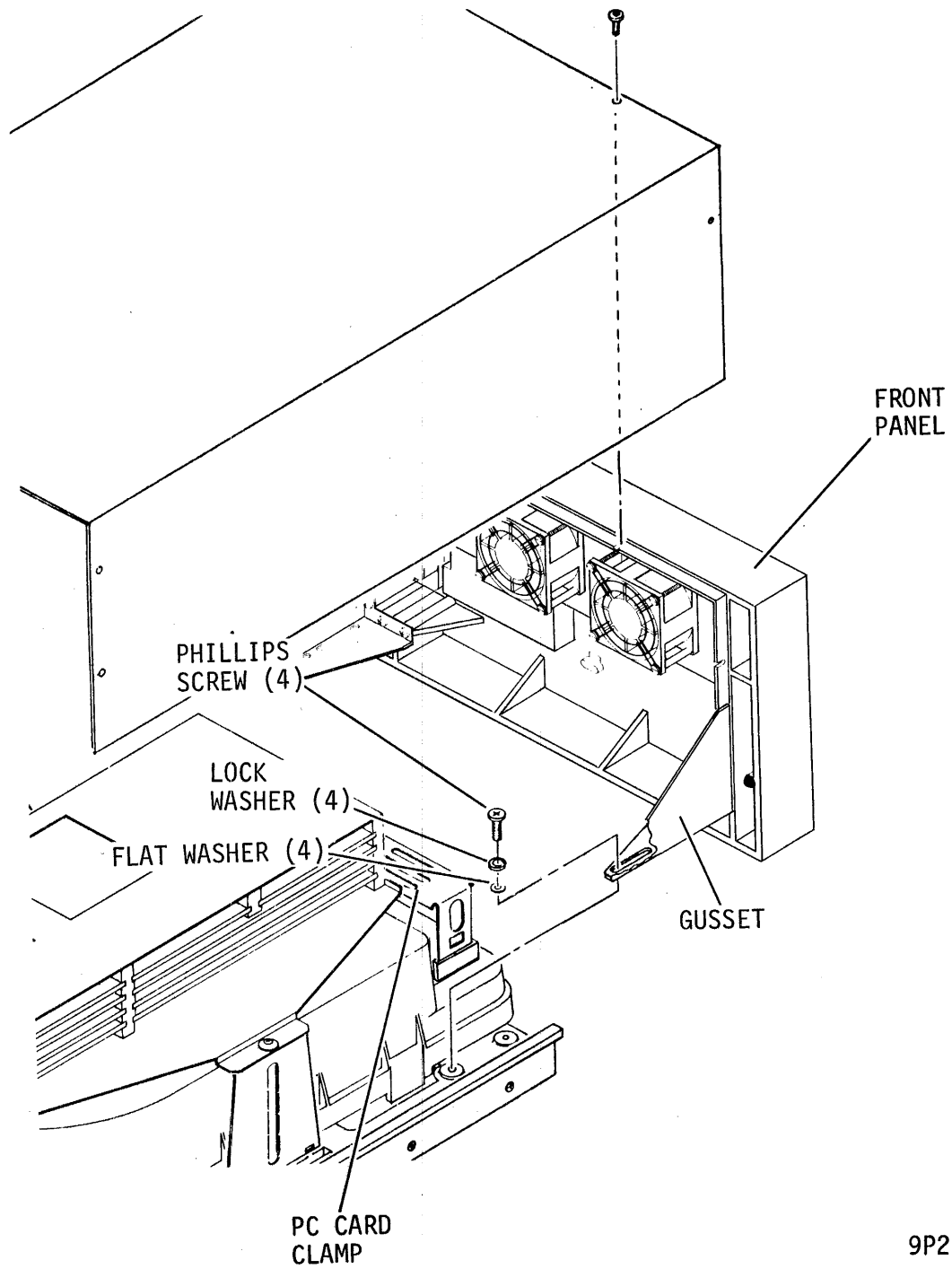


Figure 2-28. Front Panel Assembly Removal

10. Replace front panel cover by inserting top of cover first and then pushing bottom into place.
11. Return drive to online operation.

FAN REMOVAL AND REPLACEMENT

This procedure contains instructions for replacing a fan. Cable tie straps, spare connector pins, and a tool for removing connector pins are needed for fan replacement.

REMOVAL

1. Perform Top Cover Removal procedure.
2. Disconnect plugs A3P4 and A3P6 from front panel.
3. Loosen screws through gussets securing front panel to drive frame and move front panel assembly as far as possible from base frame (see figure 2-28).
4. Remove cable tie straps holding fan power and indicator leads together.
5. Remove connector pins attached to leads of defective fan from A3J6 as shown in figure 2-29.
6. Remove ground strap connected to fan mounting plate or to fans from base frame (if present).
7. Remove hardware attaching fan mounting plate to front panel.
8. Remove fan mounting plate with fans.
9. Remove hardware securing defective fan to fan mounting plate. Remove ground strap from that fan (if present).
10. Remove defective fan.

REPLACEMENT

1. Align replacement fan with screw holes on fan mounting plate.
2. Secure fan to fan mounting plate with attaching hardware as shown in figure 2-29. Replace ground strap if fan was originally grounded.

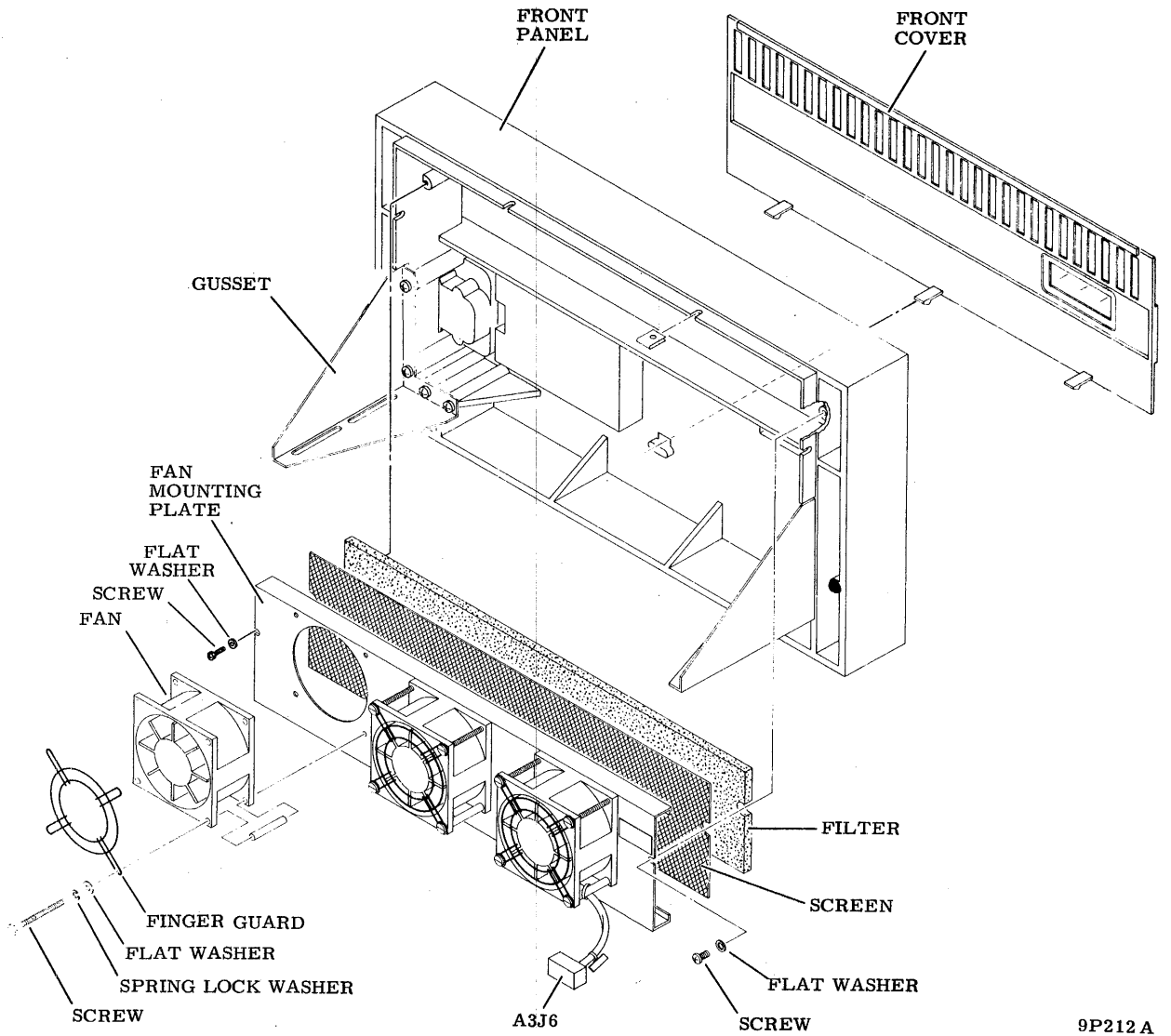


Figure 2-29. Fan Removal and Replacement

3. Cut fan power leads to lengths required. Use lead lengths on removed fan as a correct measure for leads on replacement fan.
4. Strip ends of leads and crimp a connector pin on each lead.
5. Insert pinned leads into the same locations of A3J6 from which the removed leads were taken.
6. Replace cable tie straps in approximate locations from which straps were removed.
7. Align fan plate with screw holes on each side of front panel as shown in figure 2-29.
8. Secure fan mounting plate to front panel assembly with attaching hardware as shown in figure 2-29. Reconnect ground strap to base frame if necessary.
9. Connect plugs A3P6 and A3P4 to A3J6 and A3J4 respectively.
10. Slide front panel assembly as far as possible toward base frame and tighten screws through front panel gussets.
11. Perform Top Cover Replacement procedure.

PRIMARY FILTER REMOVAL AND REPLACEMENT

This procedure contains instructions for either cleaning or replacing the primary filter.

REMOVAL

1. Remove front panel cover by pressing at top of cover until it snaps free.
2. Pull primary filter from cavity in front panel.
3. Retain filter if not defective.
4. Wash filter with detergent, dry, and spray with filter coat.

REPLACEMENT

1. Install cleaned or replacement filter back into cavity in front panel.
2. Replace front cover by inserting top of cover first and then pushing bottom into place.

DRIVE BELT REMOVAL AND REPLACEMENT

This procedure applies either to replacement of the drive belt or to temporary removal of the drive belt to allow removal of other components. On older units (units without motor tension adjustment screw, see figure 2-30.1), two people are needed to install a drive belt; one to position the drive motor and the other to align the belt on the pulleys.

REMOVAL

1. Perform Top Cover Removal procedure.
2. Perform Bottom Cover Removal procedure.

CAUTION

Do not allow spindle to rotate during drive belt removal. Rotating the spindle in the wrong direction could damage the mini module.

3. On older units, push drive motor forward until the drive belt falls off as shown in figure 2-30. On newer units, loosen motor tension adjustment screw until drive falls off as shown in figure 2-30.

REPLACEMENT

NOTE

The following step may require two people.

1. On newer units, place and hold drive belt over pulleys on drive motor and spindle. Tighten motor tension adjustment screw until tension holds drive belt on pulleys. On older units, push drive motor forward until drive belt slips over pulleys on spindle and drive motor.

CAUTION

In the following step, failure to rotate the spindle in the specified direction could damage the mini module.

2. Rotate spindle in direction shown in figure 2-30 until drive belt is centered on pulleys.
3. On newer units, tighten motor tension adjustment screw until gap between spring tensioner and base frame is as specified in figure 2-30.1.

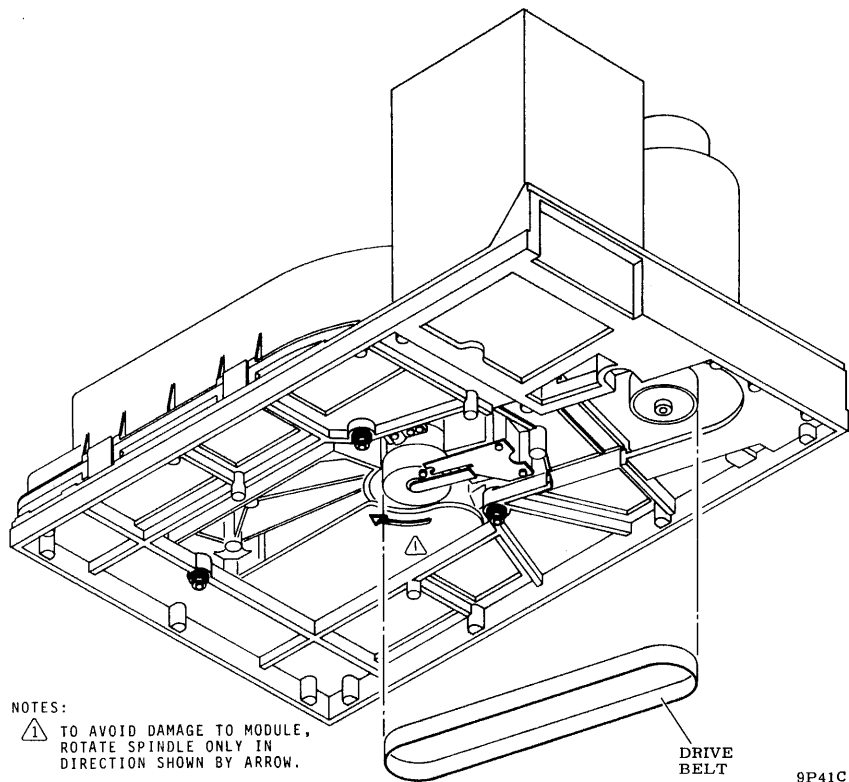


Figure 2-30. Drive Belt Removal and Replacement

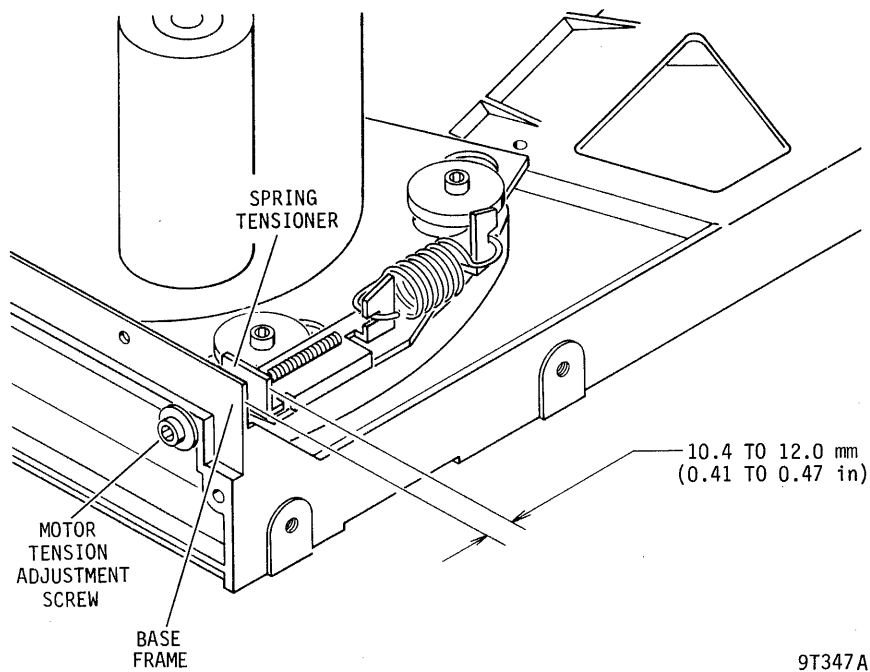


Figure 2-30.1 Motor Tension Adjustment
 Newer Units Only

MOTOR ANTISTATIC SPRING REMOVAL AND REPLACEMENT

REMOVAL

1. Perform Top Cover Removal procedure.
2. Remove motor antistatic spring by removing attaching hardware from base of spring as shown in figure 2-31.

REPLACEMENT

1. Install replacement motor antistatic spring on brake housing with attaching hardware shown in figure 2-31.
2. Perform Top Cover Replacement procedure.

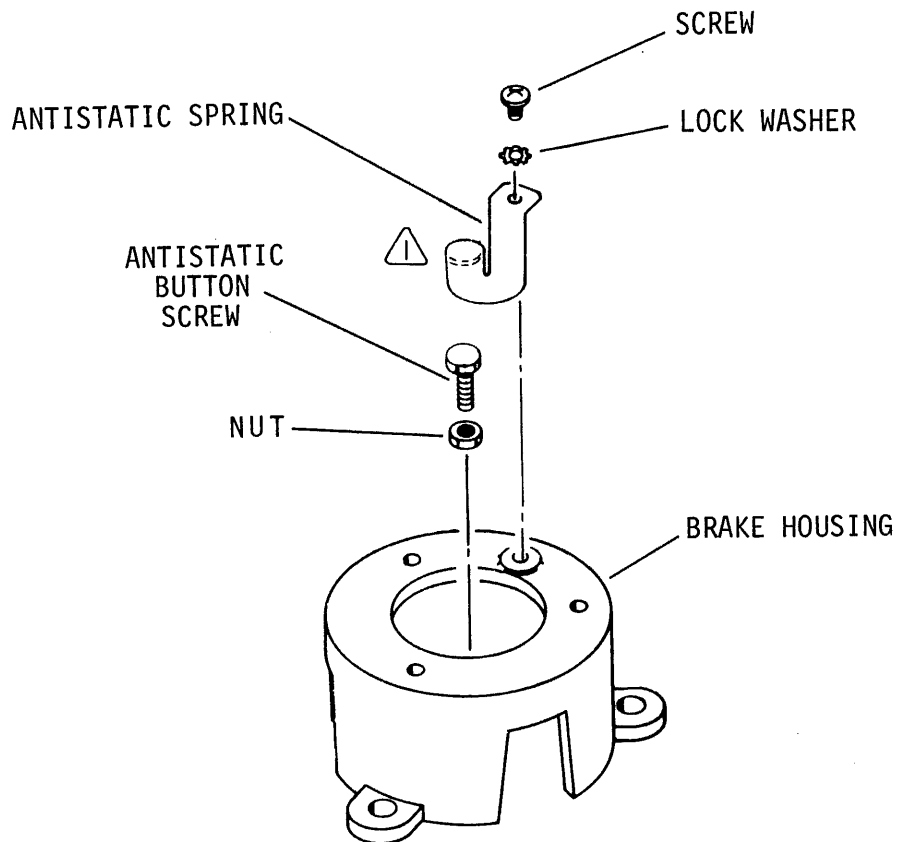
SPINDLE GROUND SPRING REMOVAL AND REPLACEMENT

REMOVAL

1. Perform Bottom Cover Removal procedure.
2. Remove spindle lock and ground spring by removing attaching hardware and ground strap (if used) as shown in figure 2-32.

REPLACEMENT

1. Install replacement spindle lock and ground spring loosely with ground strap (if used) and attaching hardware as shown in figure 2-32.
2. Position spindle lock and ground spring so that spindle shaft is centered in ground spring cup.
3. Tighten screws to hold spindle lock and ground spring in operating position.
4. Perform Bottom Cover Replacement procedure.



NOTES:

- 1 UNDERSIDE OF ANTISTATIC SPRING HAS CUP THAT CONTACTS ANTISTATIC BUTTON SCREW.

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Figure 2-31. Motor Antistatic Spring Removal and Replacement

LOGIC CHASSIS REMOVAL AND REPLACEMENT

REMOVAL

1. Perform Mini Module Removal procedure.
2. Lower logic chassis to normal operating position.
3. Disconnect I/O cables from I/O cards in logic chassis.
4. Disconnect all power leads and ground straps on logic chassis wire wrap backpanel.

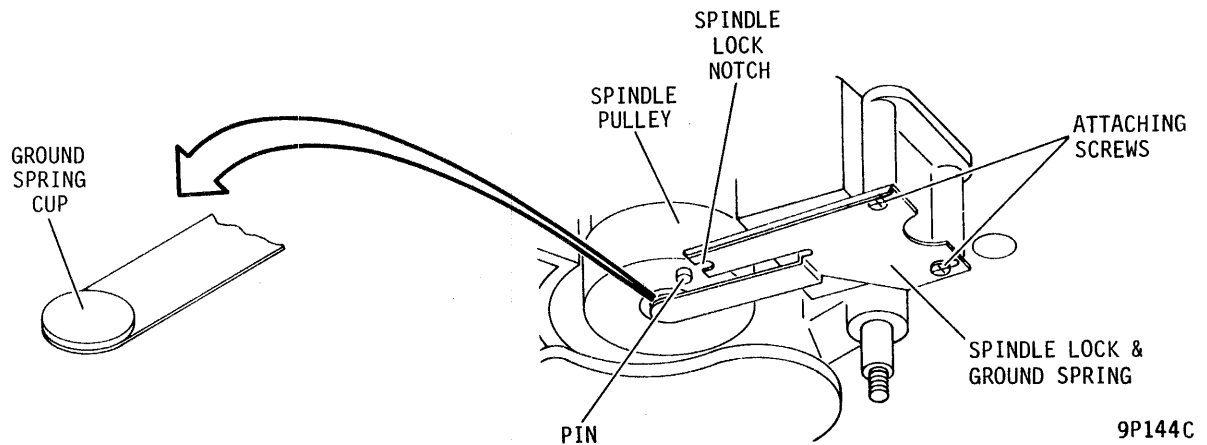


Figure 2-32. Spindle Lock and Ground Spring

NOTE

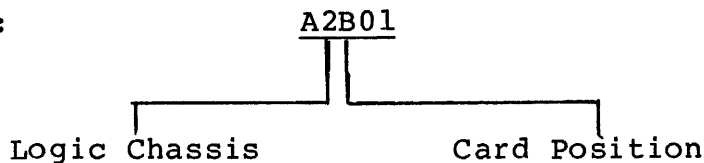
All cables in main harness have a plastic identification tag indicating the destination on logic chassis. All connectors on the end of each cable have a pin strip showing backpanel pins to which connectors attach. When connector is properly attached, the pin strip is visible (up).

5. Disconnect all logic cables from logic chassis wire wrap backpanel.
6. Support logic chassis while removing screws securing base of logic chassis to hinge. The best approach is to insert a long screwdriver up through cutouts in base frame.
7. Lift logic chassis straight up and remove.

REPLACEMENT

1. Place logic chassis hinge in normal operating position.
2. Support replacement logic chassis in normal operating position and install screws securing chassis to hinge.
3. Transfer logic cards from old logic chassis to replacement logic chassis.
4. Connect all cables to logic chassis wire wrap backpanel locations indicated on cable identification tags and connector pin strips.

Example:



The pin strips indicate wire wrap pins on which connectors are inserted.

5. Connect all power and ground leads to terminals on wire wrap backpanel.
6. Connect I/O cables to I/O cards on logic chassis.
7. Raise logic chassis to maintenance position.
8. Perform Mini Module Replacement procedure.

LOGIC CHASSIS HINGE REMOVAL AND REPLACEMENT

This procedure contains instructions for replacing the logic chassis hinge. New cable tie straps are needed for hinge replacement.

REMOVAL

1. Perform Top Cover Removal procedure.
2. Disconnect I/O cables from I/O cards in logic chassis.
3. Perform Mini Module Removal procedure.

4. Cut cable tie straps holding main harness to logic chassis hinge.
5. Remove screws securing hinge to logic chassis. The best approach is to insert a long screwdriver up through cut-outs in base frame.

CAUTION

During the remainder of this procedure, avoid straining cables and wires attached to logic chassis backpanel.

6. Rotate logic chassis to maintenance position and support it there while removing screws securing base of hinge to base frame.
7. Remove defective hinge and rest logic chassis in normal position.

REPLACEMENT

1. Rotate logic chassis to maintenance position and support it while installing screws securing base of hinge to base frame.
2. Lower logic chassis to normal position and support it there while installing screws securing hinge to logic chassis.
3. Replace cable tie straps securing main cable harness to hinge assembly.
4. Connect I/O cables to I/O cards in logic chassis.
5. Perform Mini Module Replacement procedure.
6. Perform Top Cover Replacement procedure.

MINI MODULE REMOVAL AND REPLACEMENT

The mini module is not field repairable and must not be disassembled. The only mini module components replaceable in the field are the read/write cards, the spindle lock and ground spring, and the speed transducer. For any other mini module problems, perform the following procedures to remove and replace the mini module:

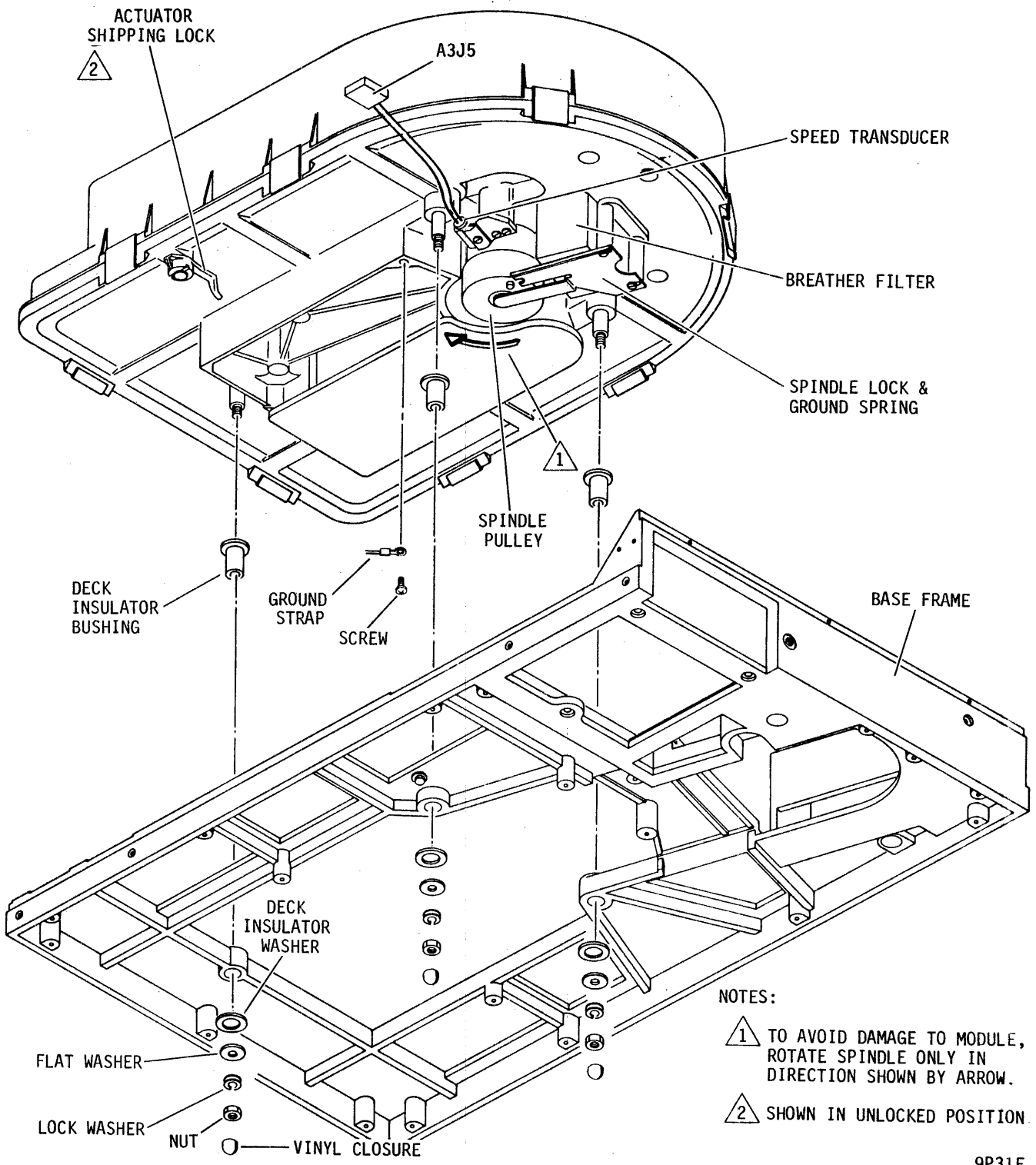
REMOVAL

1. Perform Top Cover Removal procedure.
2. Perform Bottom Cover Removal procedure.
3. Perform Drive Belt Removal procedure.
4. Lock actuator by rotating actuator shipping lock counter-clockwise to locked position (see figure 1-11).
5. Loosen screws on underside of module securing spindle lock and ground spring to module chassis. Rotate spindle in direction of arrow and position spindle lock and ground spring forward so that pin on spindle pulley is engaged in notched portion of spindle lock and ground spring. Tighten screws. See figure 2-33.
6. Disconnect speed transducer at connector A3J5.
7. Disconnect base frame ground strap from mini module (see figure 2-33).
8. Loosen screws at side of base frame as shown in figure 2-28 and slide front panel assembly as far as possible from base frame.
9. Remove PC card clamp by pressing in on each side of clamp and lifting it straight up.
10. Remove screws securing I/O cable mounts to logic chassis and rear panel of drive.
11. Raise logic chassis to maintenance position.
12. Disconnect plug A4P01 from PC assembly _NSN.
13. Disconnect plug A4P02 from PC assembly _NQN.
14. Disconnect plug A4P04 from PC assembly _WJN.
15. Disconnect ground lead from quick connect on PC assembly _WJN.

NOTE

Install PC assemblies removed in next step into the replacement mini module.

16. Remove PC assemblies _NSN, _NQN, and _NRN.



9P31F

Figure 2-33. Mini Module Removal and Replacement

17. Remove hardware attaching module to base frame as shown in figure 2-33.
18. Remove mini module by lifting it straight up until module clears drive.
19. Remove deck insulator bushings from removed module and install them back in base frame.

REPLACEMENT

1. Position replacement mini module so that three mounting studs are inserted through deck insulator bushings in holes provided in base frame (see figure 2-33).
2. Lower logic chassis to normal operating position and tighten fastener or screw at front of logic chassis to hold chassis in position.
3. Connect ground lead to quick connect on PC assembly _WJN.
4. Connect plug A4P04 to PC assembly _WJN.
5. Install PC assemblies _NSN, _NQN, and _NRN.
6. Connect plug A4P02 to PC assembly _NQN.
7. Connect plug A4P01 to PC assembly _NSN.
8. Install PC card clamp by pressing on each side of clamp and lowering into position over read/write cards.
9. Slide front panel assembly as far as possible toward base frame.
10. Tighten screws through front panel gussets.

CAUTION

In the next step, tighten hardware to a torque from 0.7 to 1.2 N·m (6 to 11 lbf·in).

11. At bottom of drive, replace hardware attaching module to base frame (see figure 2-33). Ensure that vinyl closures are installed on mini module studs.
12. Connect ground strap from base frame to mini module.

13. Plug in speed transducer at A3J5 connector.
14. Position spindle lock and ground spring so that its contact is centered on spindle shaft. Tighten screws (see figure 2-32).
15. Perform Drive Belt Replacement procedure.
16. Attach I/O cables to logic chassis and rear panel of drive by reinstalling cable mounts.
17. Unlock actuator by rotating actuator shipping lock clockwise to unlocked position (see figure 1-11).
18. Perform Bottom Cover Replacement procedure.
19. Perform Top Cover Replacement procedure.

DRIVE MOTOR ASSEMBLY REMOVAL AND REPLACEMENT

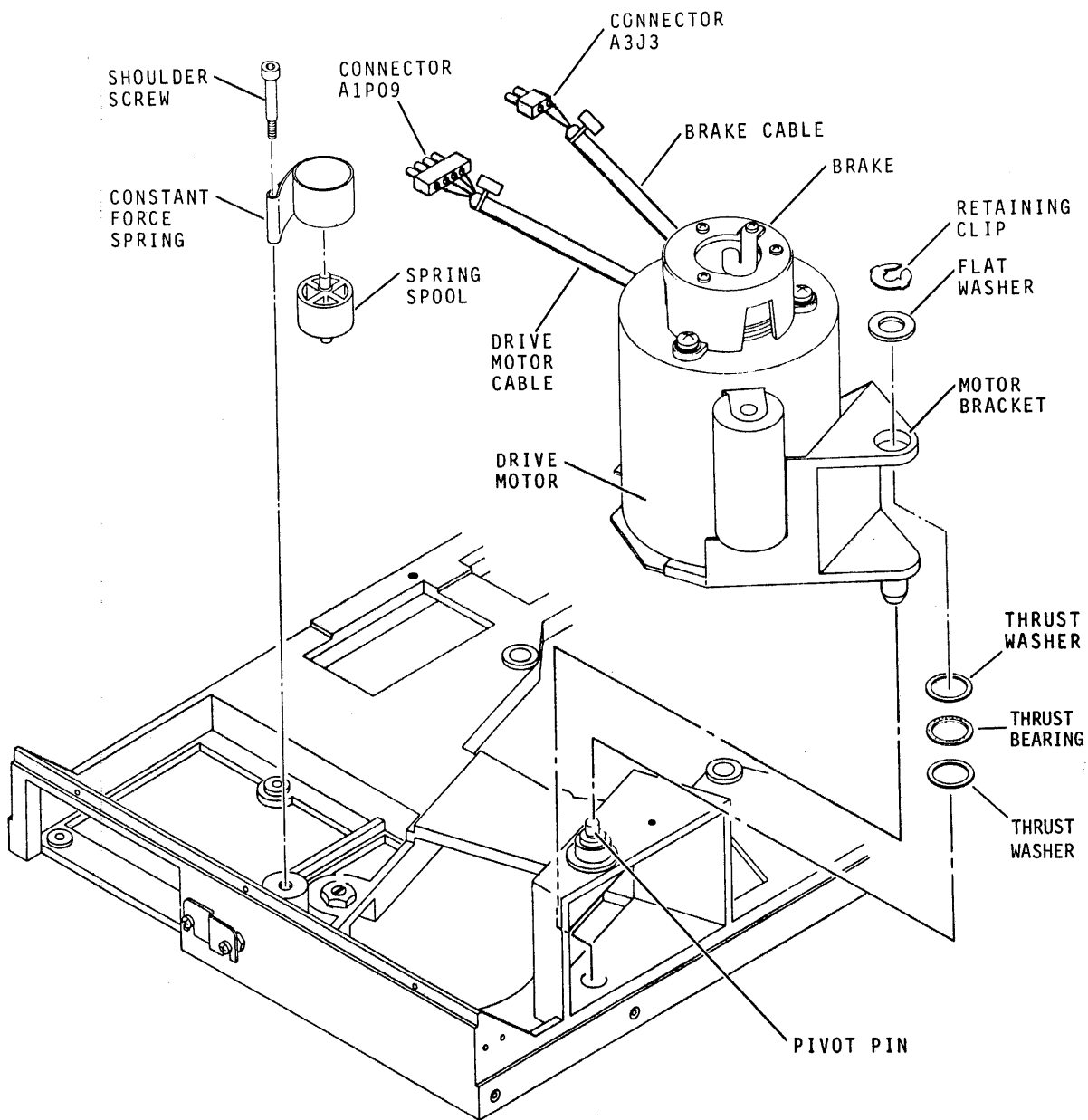
Removal and replacement of the drive motor assembly is described in two procedures, one for Series Code 20 and below, and the other for Series Code 21 and above. Drives built in Series Code 20 and below (figure 2-34) and drives built in Series Code 21 and above (figure 2-36) have different spring mechanisms attached to the drive motor.

Replacing only the drive motor is not recommended. The procedure for older drives requires two people for lifting the drive off and onto the slide rails.

REMOVAL AND REPLACEMENT (S/C 20 & BLW)

Removal (S/C 20 & Blw)

1. Extend drive fully to maintenance position.
2. Perform Bottom Cover Removal procedure.
3. Perform Drive Belt Removal procedure.
4. Perform Rear Cover Removal procedure.
5. Disconnect drive motor cable at connector ALJ09 as shown in figure 2-34.
6. Disconnect cable at connector A3J3 going to motor brake assembly.



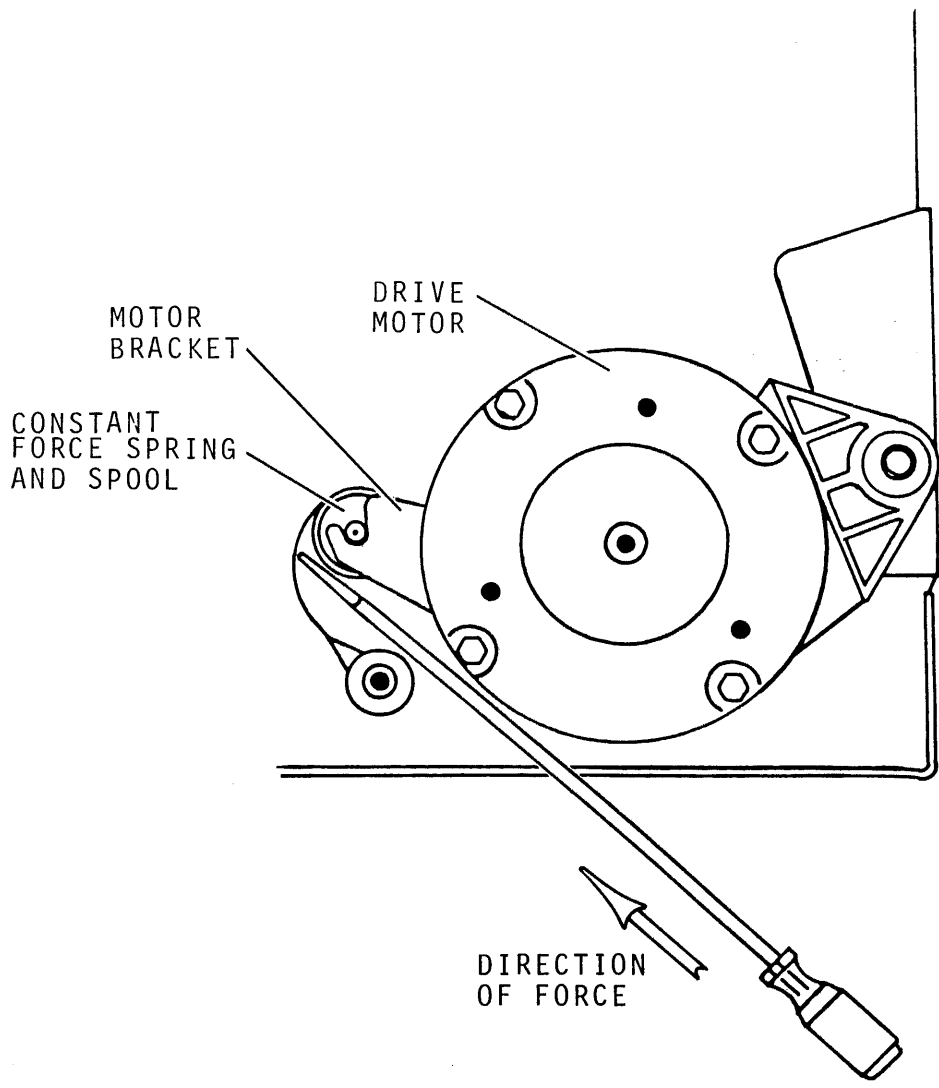
9T266A

Figure 2-34. Drive Motor Assembly (S/C 20 & BLW)

7. Remove constant force spring (see figure 2-35) by placing screw driver blade along spring and pushing forward to release spring spool from notch in motor mount plate. Slowly remove screw driver allowing spring to coil up.
8. Remove shoulder screw and set aside spring spool and constant force spring.
9. Remove retaining clip by pressing down on each side of clip and sliding clip from around pivot pin.
10. Remove flat washer from pivot pin.
11. Rotate motor bracket forward and lift motor mount to clear pivot pin and bearing hole (in base frame). Remove drive motor assembly.

Replacement (S/C 20 & Blw)

1. Position drive motor assembly so that pivot of motor bracket slides into associated hole in base frame and hole in motor bracket slides onto pivot pin. Lower drive motor assembly into position.
2. Replace flat washer on pivot pin.
3. Insert retaining clip by pressing down on both sides of clip while sliding it into notch on pivot pin.
4. Attach constant force spring as follows:
 - a. Attach constant force spring to base frame with shoulder screw.
 - b. Place screw driver blade along spring and push forward until spring uncoils allowing spring spool to slip into notch in motor bracket.
5. Reconnect drive motor and brake cables at connectors A1J09 and A3J3.
6. Perform Rear Cover Replacement procedure.
7. Perform Drive Belt Replacement procedure.
8. Perform Bottom Cover Replacement procedure.
9. Perform Top Cover Replacement procedure.



9T267

Figure 2-35. Removing Constant Force Spring (S/C 20 & BLW)

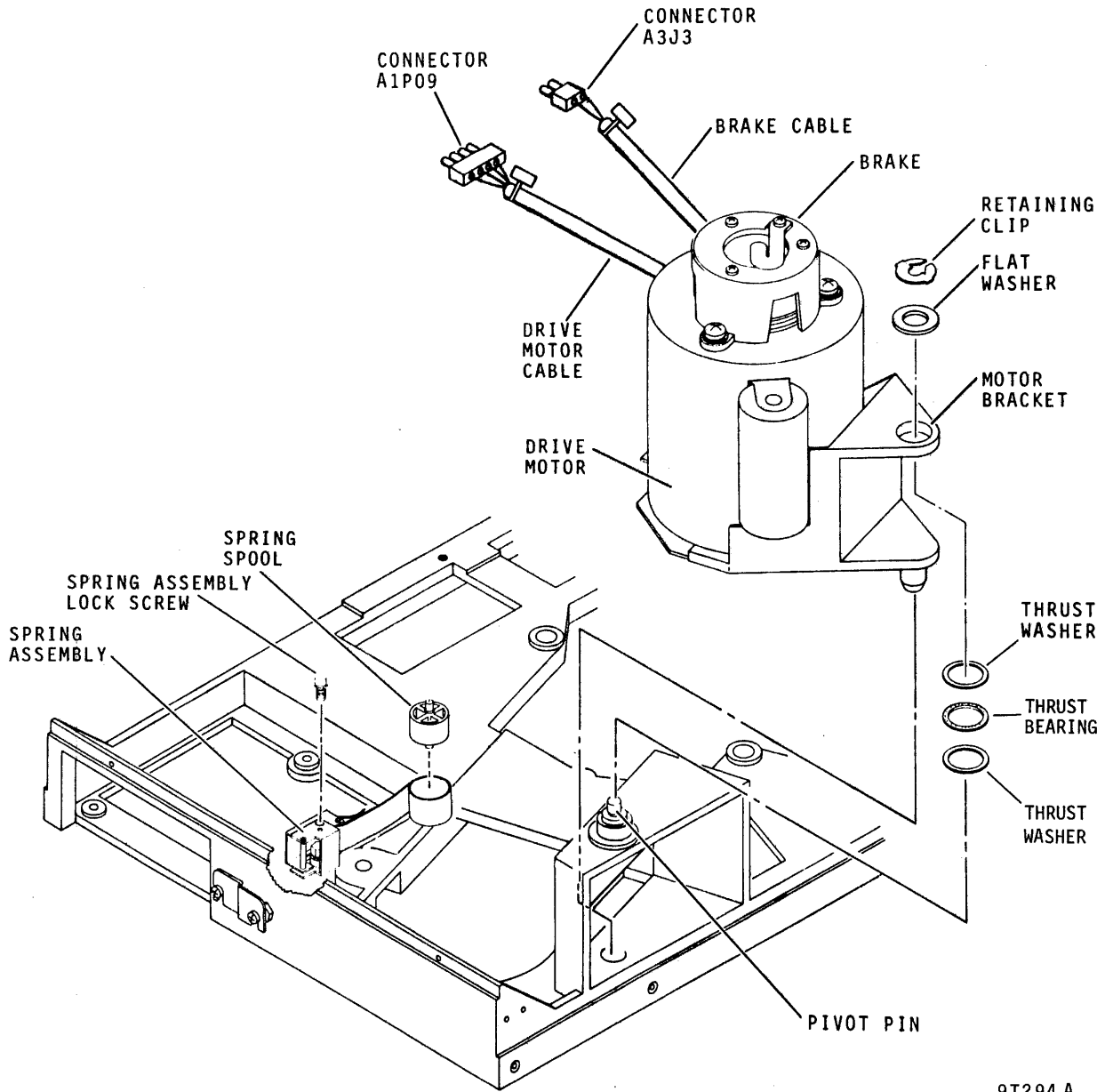
REMOVAL AND REPLACEMENT (S/C 21 & ABV)

Removal (S/C 21 & Abv)

1. Extend drive fully to maintenance position.
2. Perform Bottom Cover Removal procedure.
3. Perform Drive Belt Removal procedure.
4. Disconnect drive motor cable at connector AlJ09 as shown in figure 2-36.
5. Disconnect cable at connector A3J3 going to motor brake assembly.
6. Release constant force spring as follows:
 - a. Remove spring assembly lock screw with 5/32 in allen wrench (see figure 2-36). Set lock screw aside.
 - b. Insert 5/32 in allen wrench in hex hole in spring assembly (see figure 2-37).
 - c. Rotate allen wrench clockwise to extend spring assembly and loosen constant force spring (see figure 2-37).
 - d. Release spring spool from notch in motor bracket.
7. Remove retaining clip by pressing down on each side of clip and sliding clip from around pivot pin.
8. Remove flat washer from pivot pin.
9. Rotate motor bracket forward and lift motor mount to clear pivot pin and bearing hole (in base frame). Remove drive motor assembly.

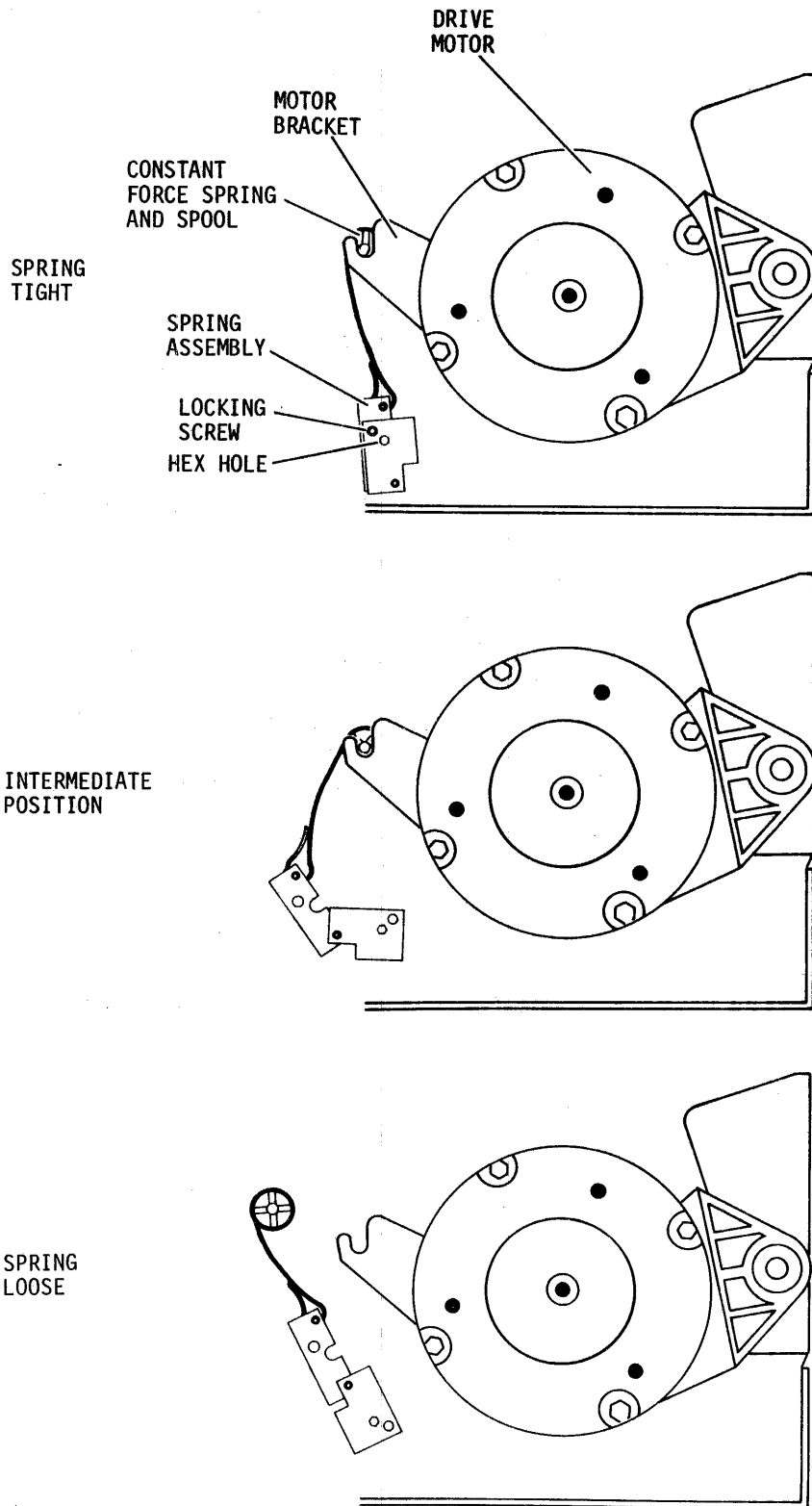
Replacement (S/C 21 & Abv)

1. Position drive motor assembly so that pivot of motor bracket slides into associated hole in base frame and hole in motor bracket slides onto pivot pin. Lower drive motor assembly into position.
2. Replace flat washer on pivot pin.
3. Insert retaining clip by pressing down on both sides of clip while sliding it into notch on pivot pin.



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Figure 2-36. Drive Motor Assembly (S/C 21 & ABV)



9T295

Figure 2-37. Removing Constant Force Spring (S/C 21 & ABV)

4. Attach constant force spring as follows:
 - a. Slip spring spool into notch in motor bracket (see figure 2-37).
 - b. Insert 5/32 in allen wrench in hex hole in spring assembly.
 - c. Rotate allen wrench fully counterclockwise to retract spring assembly and tighten constant force spring.
 - d. Replace spring assembly lock screw with 5/32 in allen wrench (see figure 2-36).
5. Reconnect drive motor and brake cables at connectors A1J09 and A3J3.
6. Perform Drive Belt Replacement procedure.
7. Perform Bottom Cover Replacement procedure.
8. Perform Top Cover Replacement procedure.

DRIVE MOTOR BRAKE REMOVAL AND REPLACEMENT

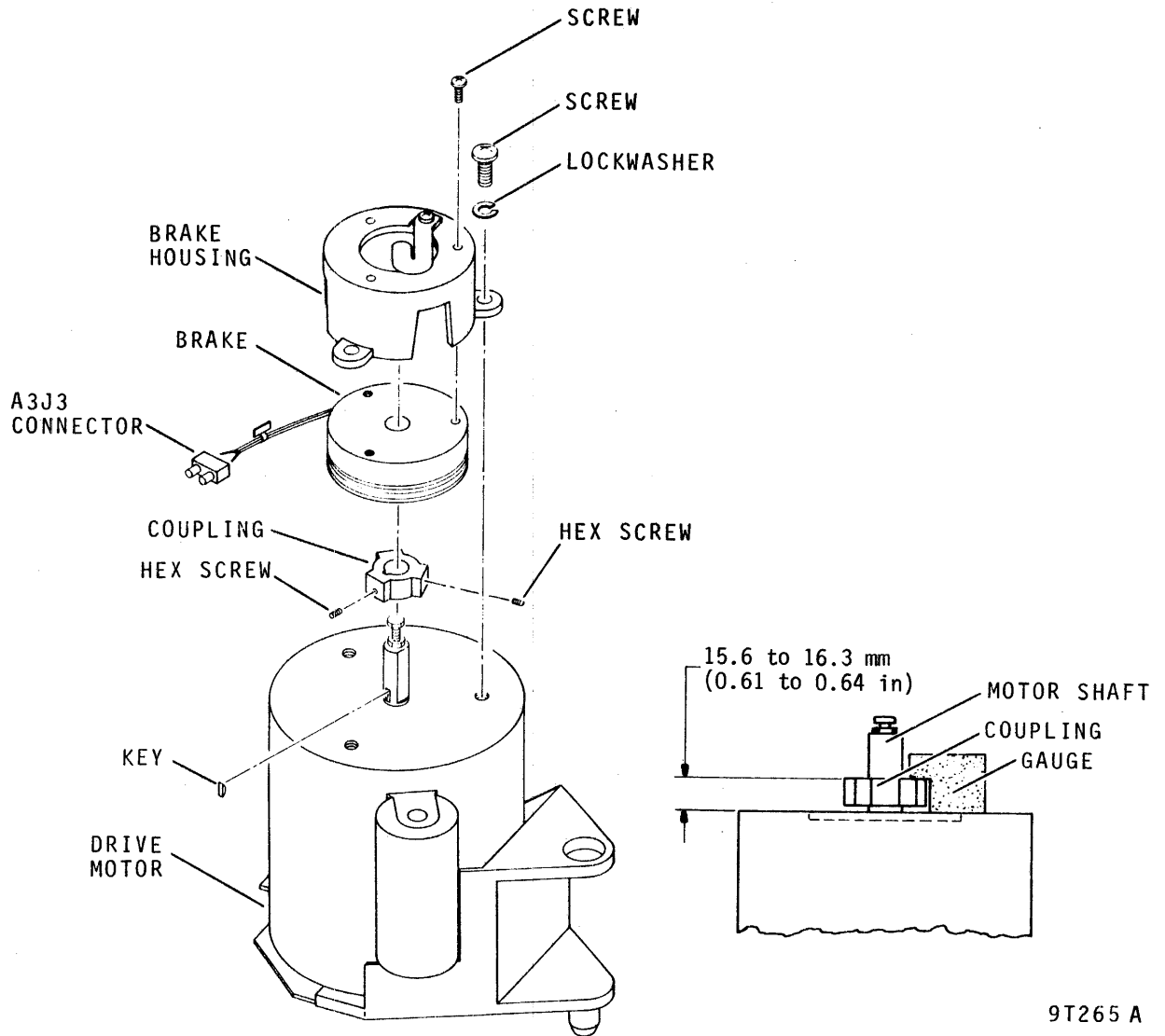
REMOVAL

1. Perform Top Cover Removal procedure.
2. Disconnect cable to brake assembly at A3J3 connector.
3. Remove hardware securing brake housing to drive motor as shown in figure 2-38.
4. Lift brake housing and brake from shaft of drive motor.
5. Remove hardware securing brake to brake housing and remove defective brake.

NOTE

It is necessary to replace the coupling on the motor shaft if the coupling looks defective or if it does not match the coupling supplied in the replacement brake kit. If so, perform steps 6 and 7.

6. Loosen hex screws securing coupling to drive motor shaft.
7. Lift and remove coupling from motor shaft as in figure 2-38.



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Figure 2-38. Brake Removal and Replacement

REPLACEMENT

NOTE

Steps 1 thru 3 apply if coupling was removed from motor shaft or is in need of adjustment. If not, proceed to step 4 for brake replacement.

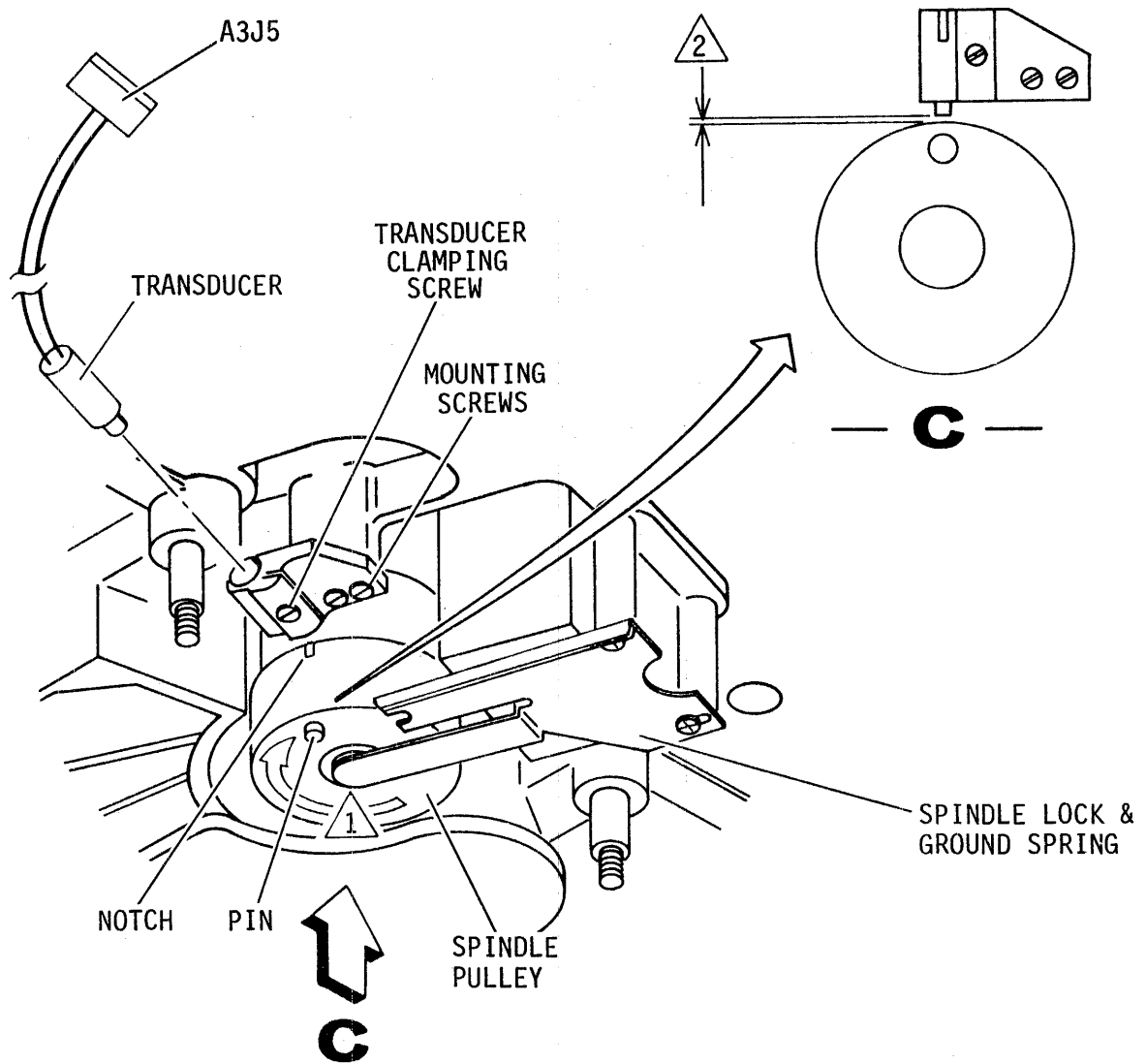
1. Align key slot in coupling with key on motor shaft.
2. Set gauge supplied with brake kit on raised surface of drive motor as shown in figure 2-38 and bring top surface of coupling into contact with gauge.
3. Tighten hex screws securing coupling to motor shaft.
4. Insert replacement brake into brake housing.
5. Secure brake to brake housing with attaching hardware shown in figure 2-38.
6. Replace brake assembly over drive motor shaft and coupling.
7. Secure brake housing to drive motor with hardware shown in figure 2-38.
8. Connect cable to brake assembly at A3J3 connector.
9. Perform Top Cover Replacement procedure.

SPEED TRANSDUCER REMOVAL AND REPLACEMENT

This procedure contains instructions for replacing or adjusting the speed transducer. Feeler gauges are needed to set the distance between the speed transducer and the spindle pulley.

REMOVAL

1. Perform Bottom Cover Removal procedure.
2. Disconnect cable to transducer at connector A3J5 as shown in figure 2-39.
3. Loosen transducer clamping screw.
4. Remove transducer from clamp.



NOTES:

△ 1 TO AVOID DAMAGE TO MODULE
 ROTATE SPINDLE ONLY IN DIRECTION
 SHOWN BY ARROW

△ 2 ADJUST SPACING TO $0.15 \pm 0.005\text{mm}$
 ($0.006 \pm 0.002 \text{ in}$) WHEN TRANSDUCER
 AND NOTCH ARE ALIGNED

9P29G

Figure 2-39. Speed Transducer Removal and Replacement

REPLACEMENT

1. Rotate spindle pulley in direction of arrow.
2. Insert replacement transducer into clamp and adjust distance between transducer and spindle pulley as specified in figure 2-39.
3. Tighten transducer clamping screw.
4. Recheck distance between transducer and spindle pulley, and correct it if necessary.
5. Rotate spindle pulley in direction shown by arrow to verify that speed transducer does not contact spindle pulley.
6. Connect cable to transducer at connector A3J5.
7. Perform Bottom Cover Replacement procedure.

POWER SUPPLY REMOVAL AND REPLACEMENT

REMOVAL

1. Disconnect power cord from ac source and from power supply.
2. Perform Top Cover Removal procedure.
3. Disconnect plugs AlP03, AlP02, AlP09, and AlP10 from power supply.
4. Disconnect all ground straps from power supply and make a note of their location.

NOTE

When removing cable tie straps, hold mounting hardware to prevent it from falling into power supply.

5. Remove cable tie straps holding cables to power supply.

NOTE

On units series code 23 through 26, the screws attaching one of the power supply support brackets to the base frame may be inaccessible with the rear cover in place. On these units only, step 6 must be performed.

6. Perform Rear Cover Removal procedure (if necessary).
7. Remove hardware securing power supply to base frame.
8. Lift power supply straight up and remove.

REPLACEMENT

1. Remove power selector plug (P07) from defective power supply and install on replacement power supply.

NOTE

Plug P05/P06 should be installed in J05 for 50 Hz units, or in J06 for 60 Hz units.

2. Check location of plug P05/P06 on replacement power supply. Change location if necessary.
3. Position replacement power supply in alignment with three holes in base frame.

NOTE

Units series code 22 and below do not have holes in the base frame to attach one of the support brackets on the new replacement power supplies. If the holes are not available, the support bracket may be either removed or left as is on the power supply. It is not required for drive operation.

4. Secure power supply to base frame with attaching hardware.
5. Perform Rear Cover Replacement procedure (if necessary).
6. Connect all ground straps on replacement power supply in their original locations.
7. Replace cable tie straps securing cables to power supply.

SECTION 3

DIAGRAMS

INTRODUCTION

This section includes the logic diagrams and the diagram conventions. The diagram conventions, along with the microcircuits manual, provides the necessary information to understand and use the diagrams.

DIAGRAM CONVENTIONS

The diagram conventions used in the logic diagrams are:

- Symbology
- Abbreviations
- Logic Levels
- Signal Names
- Logic Arrangement
- Intersheet References
- Diagram Cover Sheets

An explanation of each of the above is included in the following paragraphs.

SYMBOLOGY

The diagrams contain standard schematic symbology and logic symbology. Logic symbology as identified in his manual refers to integrated circuits. Typically, all logic symbols contain three lines of information (see figure 3-1). All logic symbols have a qualifying symbol, an element identifier, and a physical location coordinate.

Qualifying Symbol

Refer to the microcircuits manual for a detailed list and an explanation of the qualifying symbols used in the diagrams.

Element Identifier

The second line of any logic symbol contains the element identifier. The element identifier defines the type of circuit involved. Integrated circuits are identified by a series of numbers (example: 175). This series of numbers may have a letter or series of letters following it (example: 175 H). A detailed description of all integrated circuits used can be found in the microcircuits manual.

Coordinate Designator

The third line pertains to components on the card assemblies and contains the physical location coordinates of the components. The coordinate is a four character designation XXYY. The X coordinate runs along the exposed edge of the card assembly when installed into the logic chassis. The Y coordinate runs along the side of the card assembly giving the XY plane grid pattern. Refer to figure 3-1 and 3-2.

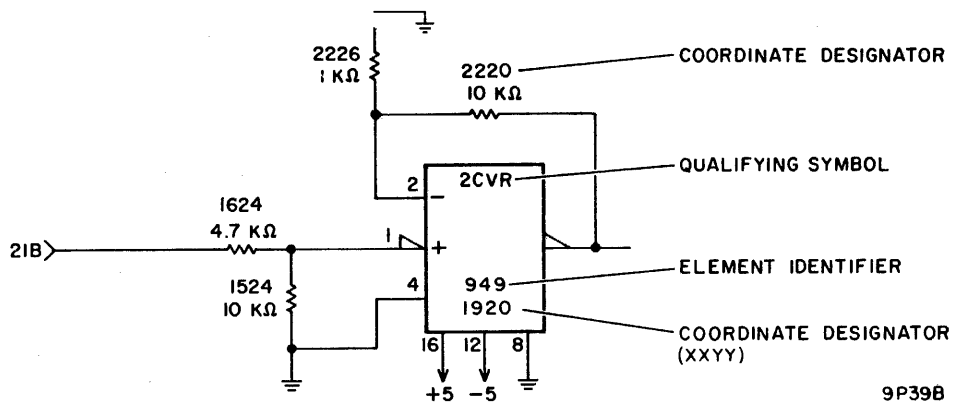
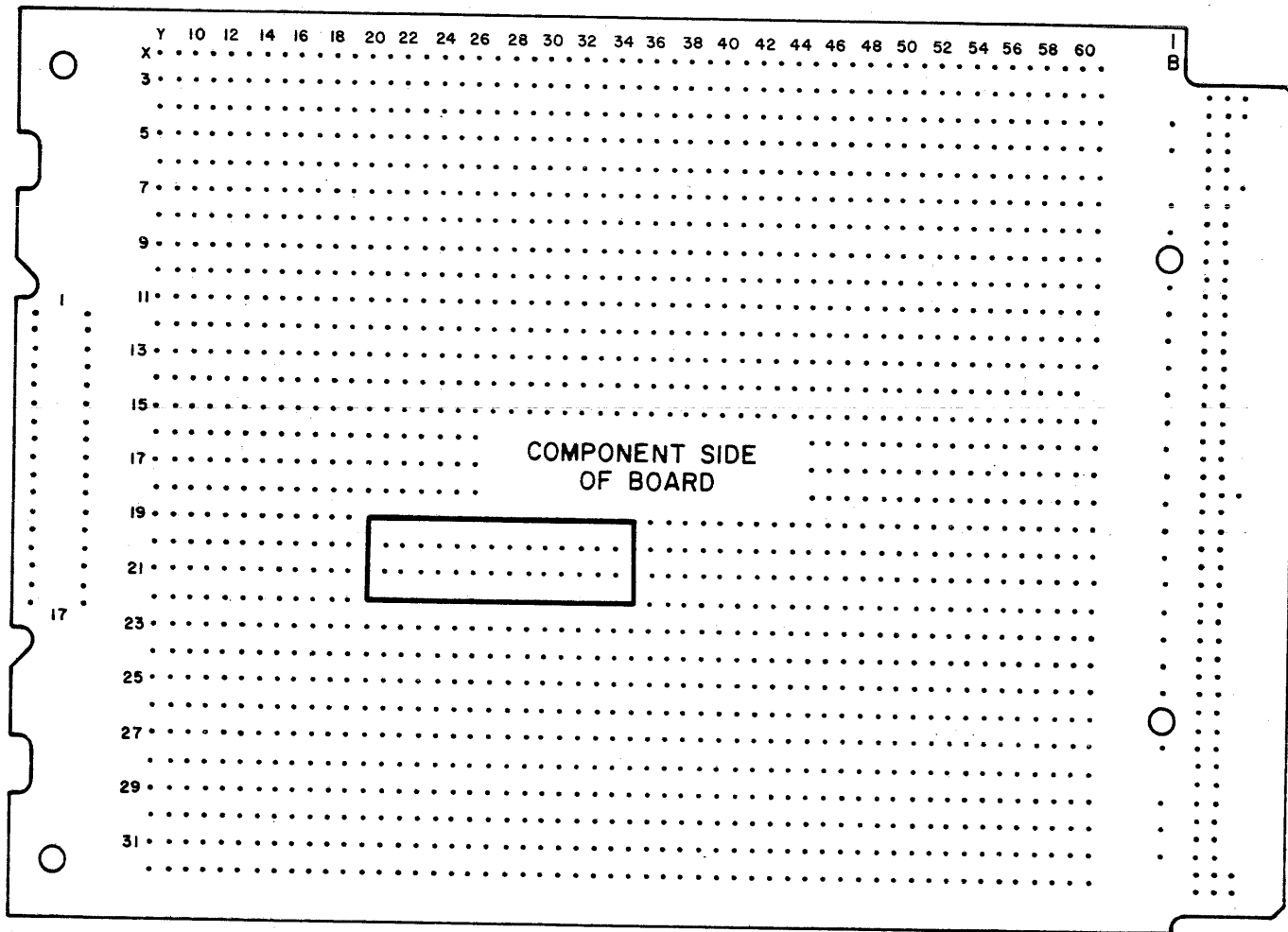


Figure 3-1. Component Location Designations

Figure 3-2. Card Assembly Coordinates



ABBREVIATIONS

Abbreviations are used in the logic diagrams whenever it is impractical or impossible to use complete nomenclature. Standard abbreviations from ANSI Y1.1 were used when possible. Refer to the list of abbreviations included in the front matter for a definition of all abbreviations used in the manual.

LOGIC LEVELS

Three types of logic are used in the drives covered by this manual: TTL logic, ECL logic, and CMOS logic. Logic Levels for the three types are given in table 3-1. Different circuit configurations and temperatures may result in legitimate readings that fall outside of the typical range. Such readings, however, should be suspect only in the event of trouble.

TABLE 3-1. LOGIC VOLTAGE LEVEL

Logical State	Nominal Voltage	Typical Range
TTL "1" TTL "0"	+3 V 0 V	+2.5 V to +4.0 V* 0 V to +0.9 V
ECL "1" ECL "0"	-0.9 V -1.8 V	-0.61 V to -0.97 V -1.52 V to -2.38 V
CMOS "1" CMOS "0"	+5 V 0 V	+3.5 V to +5.0 V 0 V to +1.5 V

* Measuring a TTL open collector voltage may result in a reading that is close to the actual power supply voltage.

SIGNAL NAMES

All input or output signals are labelled to reflect their particular function. If an output signal has no connection, and therefore no function, it is labelled "NC" to indicate no connection. The polarity (logical state) of a signal is identified by a plus or minus sign before the signal name. A plus sign before a signal name indicates that the signal is active when the logic level is high or in a logical 1 state. A minus sign before a signal name indicates that the signal is active when the logic level is low or in a logical 0 state. Refer to the discussion on logic levels.

LOGIC ARRANGEMENT

Logic diagrams for the drive consist of several independent logic and schematic diagrams (see Chassis Map). With the drive in its normal operating position the A2A01 would be at the lower left in the logic chassis as viewed from the card edges. The logic card A2C04 would be in the upper right hand corner of the logic chassis.

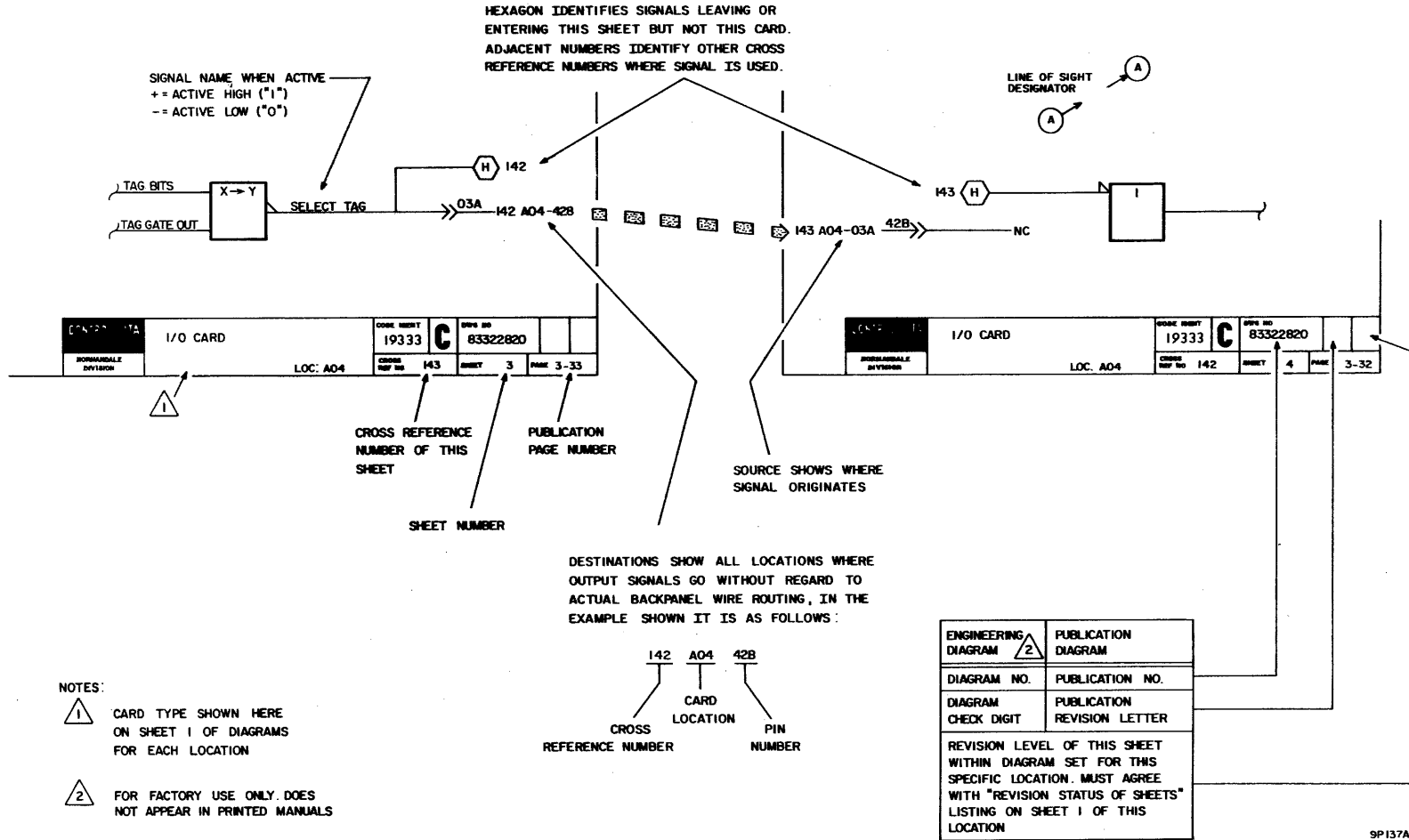
The read/write pc cards have an independent physical arrangement from front to back on the mini module, with logic card A3A1 at the front and logic card A3A3 at the back.

INTERSHEET REFERENCES

The key to understanding the independent logic diagrams and schematics is to become familiar with the scheme used to identify the relationship between the various card logics. This scheme uses cross reference numbers, physical location codes and pin numbers (see figure 3-3).

The cross reference number is a three digit number. The first two digits indicate the independent logic diagrams referenced. The third digit indicates a particular sheet of the independent logic diagrams. For example, in reference number 131, the first two digits indicate independent logic 13 and the third digit indicates page 1. Since the logic diagrams are used with more than one drive configuration, it is possible to have identical cross reference numbers on two or more similar independent logic diagrams. In cases where a reference number is used on more than one independent logic diagram, the cover sheet of each applicable logic diagram will be labelled with the appropriate drive configuration. Cross reference numbers are also used within the logics, so that the logics can be traced from one logic diagram to another. A cross reference

Figure 3-3. Intersheet Referencing



number on the output of a logic signal indicates a continued logical sequence to another (or more) logic diagram. A cross reference on the input signal indicates the origin of the signal. Where a logic signal does not leave the logic diagram, but is continued on some other sheet of the same diagram, the cross reference number of the destination sheet is shown. In such cases, the cross reference number is preceded by a hexagon. The hexagon is identified with a letter to indicate a specific location on the destination sheet. Where a logical sequence cannot be shown in series, yet it does not leave the logic sheet, "line of sight" arrows are used to indicate the origin and destination of the sequence. The end of a logical sequence is shown with a line of sight arrow pointing away from a small circle identified with a letter. A second circle identified with the same letter, will have a line-of-sight arrow pointing in the same direction as the first. The second arrow indicates where the logical sequence continues.

The physical location code is an alpha-numerical code, such as A2A04, that identifies the relationship between the logics and their physical location on the drive. All physical location codes are represented in the logic. Refer to table 3-2 for physical location codes. The major physical location codes are as follows:

- A1 power supply distribution and associated power distribution cabling.
- A2 logic chassis and all the logics associated with the chassis.
- A3 base frame assembly including cable harnesses, front panel assembly and drive motor assembly.
- A4 mini module including connectors and card assemblies.

Pin numbers used in the logic are for identifying logic signals at their respective input output locations. Pin numbers are identified by a three character number, such as 14A (see figure 3-4). The tag information on all input output signals should reflect a reference number, a physical location code, and a pin number respectively.

Logic diagrams 41X contains the cabling information for all interchassis logic signals on logic diagrams 01X thru 55X. Interassembly connections are shown by an interassembly designator which is a small square with a location code inside, such as (A3). An interassembly designator used at the output of a logic signal indicates that the signal goes to the assembly indicated by the designator.

TABLE 3-2. CONTENTS OF DIAGRAMS

Cross Reference No	Card Location	Title
None	None	Key To Logic
011	A1	MMD Power Supply (AC)
012	A1	MMD Power Supply Schematic and Wiring
021	A1A1	DC Voltage Reg Board
022	A1A1	DC Volt Reg Part 1
023	A1A1	DC Volt Reg Part 2
024	A1A1	DC Volt Reg Part 3
111	A2A01	Write PLO
112	A2A01	Servo Clock
113	A2A01	Phase Lock Oscillator
114	A2A01	NRZ to MFM Data
115	A2A01	Write Precompensation
131	A2A03	Read PLO
132	A2A03	Read PLO
133	A2A03	Read PLO Input/Output
134	A2A03	Address Mark Detector
141	A2A04	Channel I I/O
142	A2A04	CH I Receivers and Unit Select
143	A2A04	CH I Receivers
144	A2A04	CH I Receivers and Seq Power
145	A2A04	CH I Transmitters
146	A2A04	CH I Transmitters
211	A2B01/C01	Analog Servo
212	A2B01/C01	Servo Demodulator
213	A2B01/C01	Double CYL Pulse Gen and Position Circuits
214	A2B01/C01	Level Detectors
215	A2B01/C01	Power Amp Drive and Voltage Fault
216	A2B01/C01	Fine Servo and Retract
217	A2B01/C01	Target Velocity
221	A2B02/C02	Fault/Control
222	A2B02/C02	Fault Latches

Table Continued on Next Page

TABLE 3-2. CONTENTS OF DIAGRAMS (Contd)

Cross Reference No	Card Location	Title
223	A2B02/C02	On Cylinder Blanking
224	A2B02/C02	Power On Control and Speed OK
225	A2B02/C02	Guard Bands/Unit Select
226	A2B02/C02	Sector Counter
227	A2B02/C02	Demodulator Gates and Write Protected
228	A2B02/C02	Sequence Power and Seek Error
229	A2B02/C02	Fixed and Movable HD
231	A2B03	Microprocessor Control
232	A2B03	Cylinder Address Register
233	A2B03	Microprocessor
234	A2B03	Memory
235	A2B03	Cylinder Pulse Control
236	A2B03	Control and Status
241	A2B04	Channel II I/O
242	A2B04	CH II Receivers and Unit Select
243	A2B04	CH II Receivers
244	A2B04	CH II Receivers and Seq Power
245	A2B04	CH II Transmitters
246	A2B04	CH II Transmitters
341	A2C04	Dual Channel Steering
342	A2C04	Channel Selected Reserved and Busy
343	A2C04	Channel Enabled/Disable
344	A2C04	Disable, Interrupt, and Seek End
351	A2C05	Power Amp
352	A2C05	Power Amp
411	A3	MMD Cabling
412	A3	MMD Cabling Part 1
413	A3	MMD Cabling Part 2
414	A3	MMD Cabling Part 3
421	A3	Fault Code Display
422	A3	Fault Code Display
511	A4A1	Digital Read
512	A4A1	Digital Read Part 1

Table Continued on Next Page

TABLE 3-2. CONTENTS OF DIAGRAMS (Contd)

Cross Reference No	Card Location	Title
513	A4A1	Digital Read Part 2
514	A4A1	Digital Read Part 3
521	A4A2/B2	Writer and Select
522	A4A2/B2	Writer Part 1
523	A4A2/B2	Writer Part 2
524	A4A2/B2	Movable Head Select
525	A4A2/B2	Fixed Head Select
531	A4A3/B3	Read Analog
532	A4A3/B3	Read Analog Part 1
533	A4A3/B3	Read Analog Part 2
534	A4A3/B3	Read Analog Part 3
541	A4A4	Read/Write Motherboard
542	A4A4	Read/Write Motherboard Part 1
543	A4A4	Read/Write Motherboard Part 2
544	A4A4	Read/Write Motherboard Part 3
551	A4	Fixed Head Shoe (Outer)
552	A4	Fixed Head Shoe (Outer)
553	A4	Fixed Head Select (Outer)
554	A4	Fixed Head Select (Outer)
555	A4	Fixed Head Select (Outer)
556	A4	Fixed Head Select (Outer)
557	A4	Fixed Head Data (Outer)
558	A4	Fixed Head Data (Outer)
559	A4	Fixed Head Data (Outer)
560	A4	Fixed Head Data (Outer)
561	A4	Fixed Head Shoe (Inner)
562	A4	Fixed Head Select (Inner)
563	A4	Fixed Head Select (Inner)
564	A4	Fixed Head Select (Inner)
565	A4	Fixed Head Select (Inner)
566	A4	Fixed Head Data (Inner)
567	A4	Fixed Head Data (Inner)
568	A4	Fixed Head Data (Inner)
569	A4	Fixed Head Data (Inner)
570	A4	Fixed Head Data (Inner)

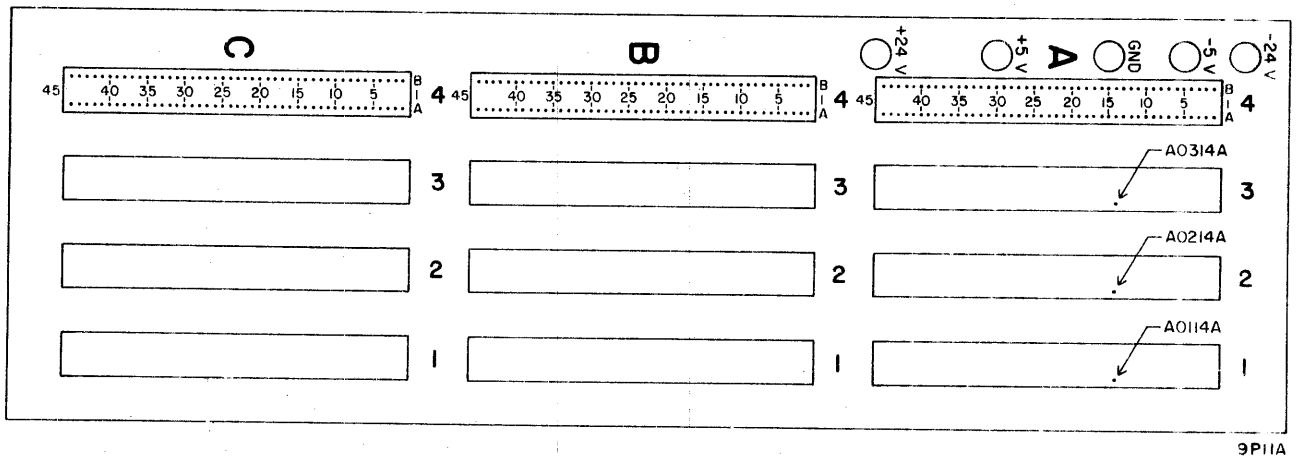


Figure 3-4. Logic Chassis Backpanel

All logic chassis backpanel wiring is shown in the wire list. Figure 3-4 gives the physical arrangement of the backpanel from the wire wrap side.

DIAGRAM COVER SHEETS

The diagram cover sheet is the first sheet of each logic set. Power and ground connections, revision status, card type information, and a list of unused circuit elements are found on the cover sheet. Power enters the drive from the driver power plug (P1), is rectified, and then distributed to the wire wrap panel quick connects. The wire wrap panel then distributes power to the logic cards. The cover sheets show which pins receive that power. All power connections show the point of origin for the power source except those that are most common. The most common power connections are:

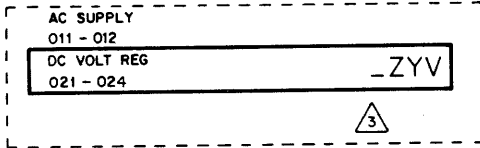
- -24 V quick connect, which feeds pins 1A and 1B on all cards.
- +24 V quick connect, which feeds pins 45A and 45B on all cards.

- -5 V quick connect, which feeds pins 2A and 2B on all cards.
- +5 V quick connect, which feeds pins 44A and 44B on all cards.
- GND quick connect, which feeds pins 6A, 6B, 23A, 23B, 39A and 39B on all cards.

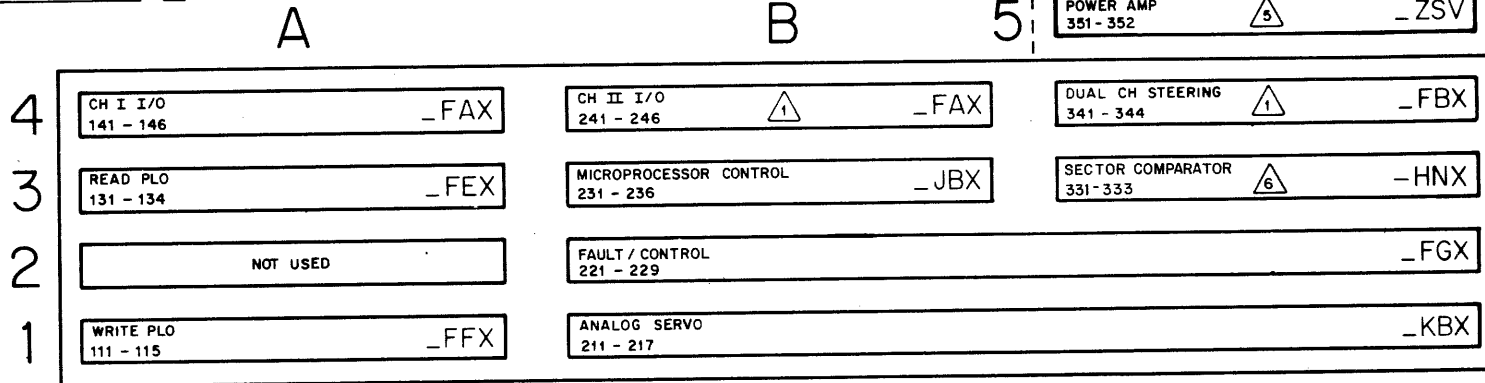
The revision of each logic sheet within the logic set is shown in the upper left-hand corner of the cover sheet. The upper right-hand corner of the sheet contains a record of the changes made to the logic set. The latest revision letter shown in the revision record should always match the letter of the cover sheet.

The cover sheet also shows the card type which appears in the title block below the card name. Refer to figure 3-3 for an explanation of all pertinent information shown in the title block.

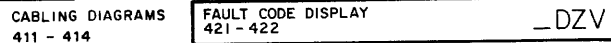
POWER SUPPLY - [A1] 011 - 024



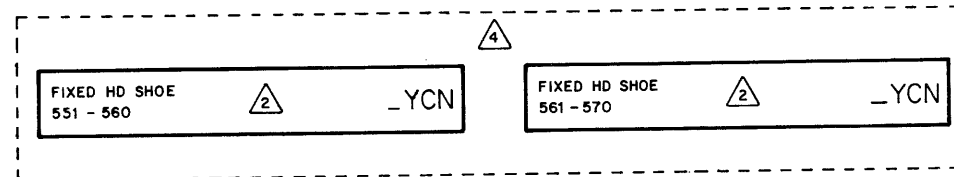
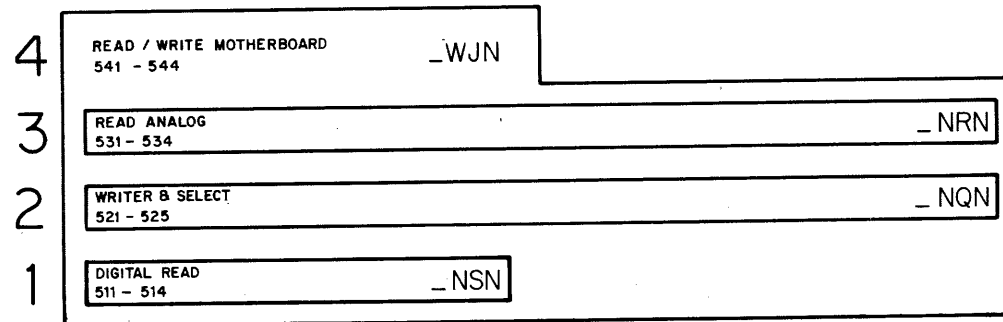
LOGIC CHASSIS - [A2] 111 - 352



DECK ASSEMBLY - [A3] 411 - 422



MODULE - [A4] 511 - 570



KEY	FUNCTIONAL NAME CROSS REF NO	MODULE TYPE IDENTIFIER
-----	---------------------------------	---------------------------

NOTES:

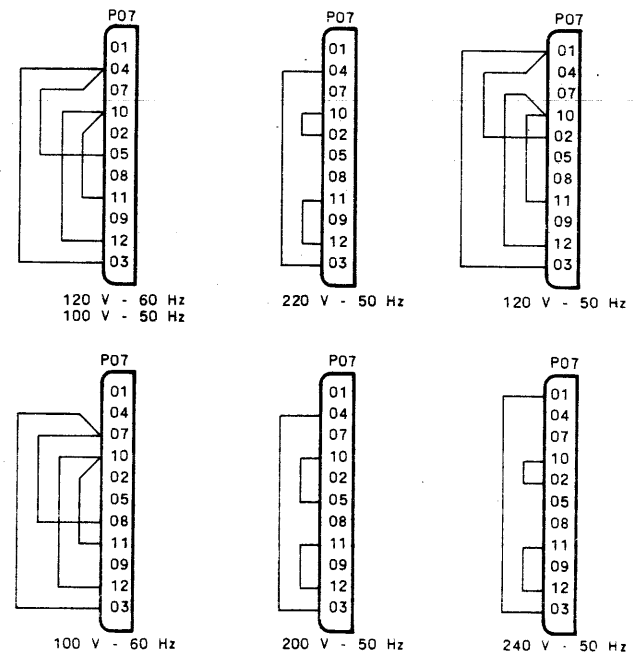
- 1 DUAL CHANNEL UNITS ONLY.
- 2 APPLICABLE ONLY TO UNITS WITH FIXED HD SHOE OPTIONS.
- 3 LOCATED INSIDE POWER SUPPLY [A1]
- 4 LOCATED INSIDE MODULE [A4]
- 5 LOCATED ON THE TOP OF LOGIC CHASSIS [A2]
- 6 USED ONLY IN UNITS WITH LONG LAST SECTOR

CONTROL DATA NORMANDEALE DIVISION	CHASSIS MAP	CODE IDENT 19333	C	83323150	N	B
		CROSS REF NO				

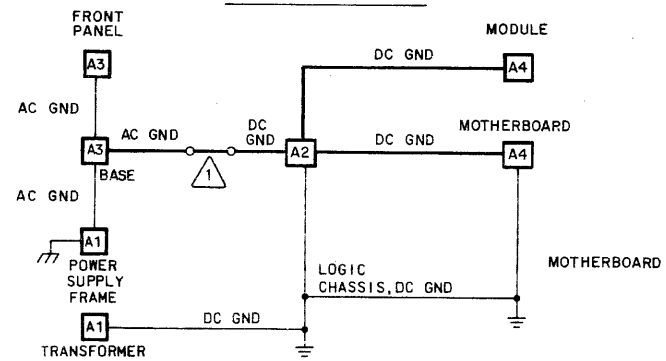
REVISION STATUS OF SHEETS																				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
A	A																			
B	B																			

REVISION					
NO.	ECO.	DESCRIPTION	DRFT	DATE	CHK'D
A	PE23000	RELEASED			
B	PE50617	BZTV TO CZTV	TH	12-26-79	

VOLTAGE PROGRAMING PLUGS



MMD GROUNDING DIAGRAM



NOTE:
 1 AC/DC GND SHORTING BAR.

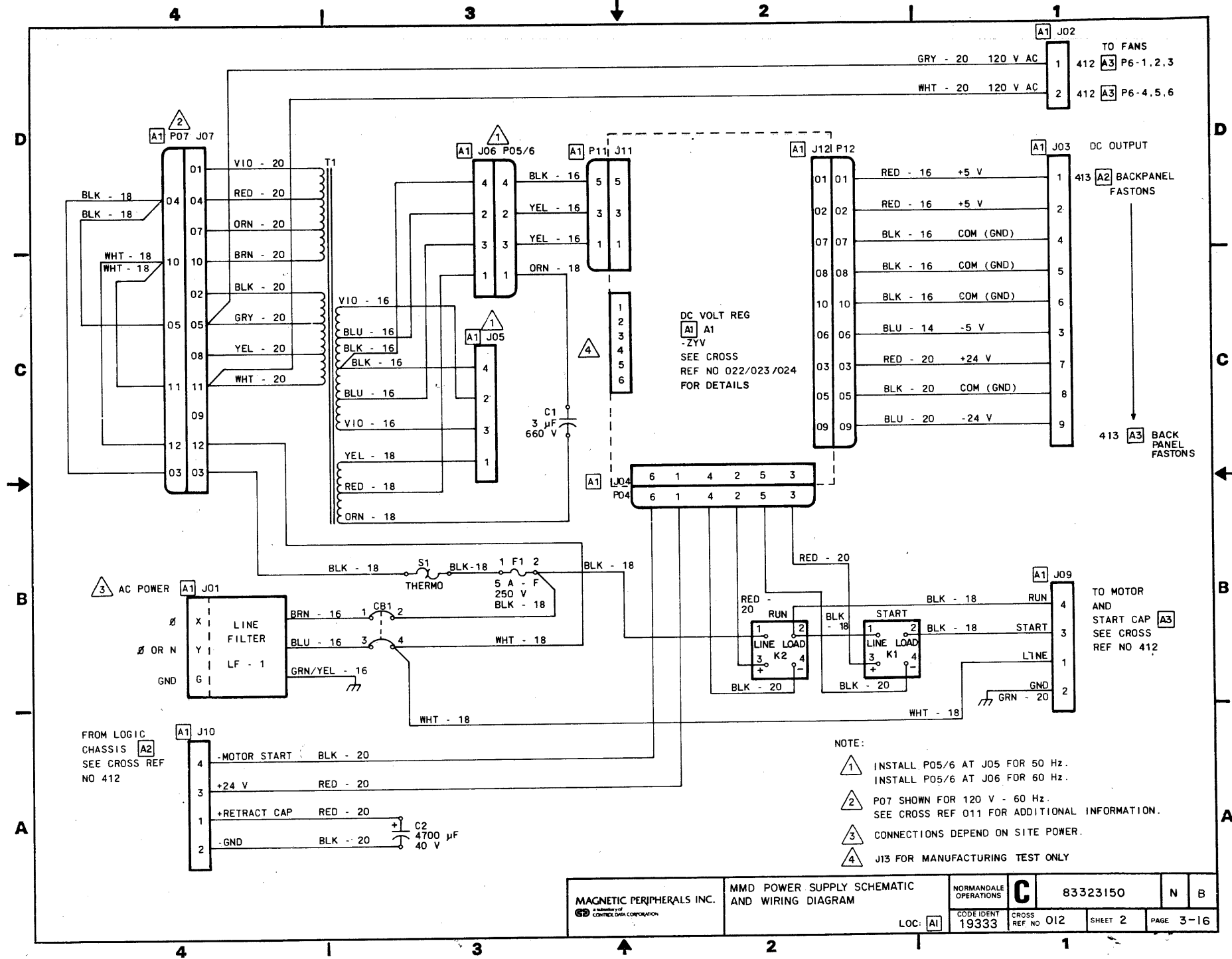
DRAWN	<i>M. Anderson</i>	4-9-79
CHECKED		
ENGINEER		
APPROVED		

MAGNETIC PERIPHERALS INC.
 A DIVISION OF
 CONTROL DATA CORPORATION

MMD POWER SUPPLY (AC)
 DIAGRAM

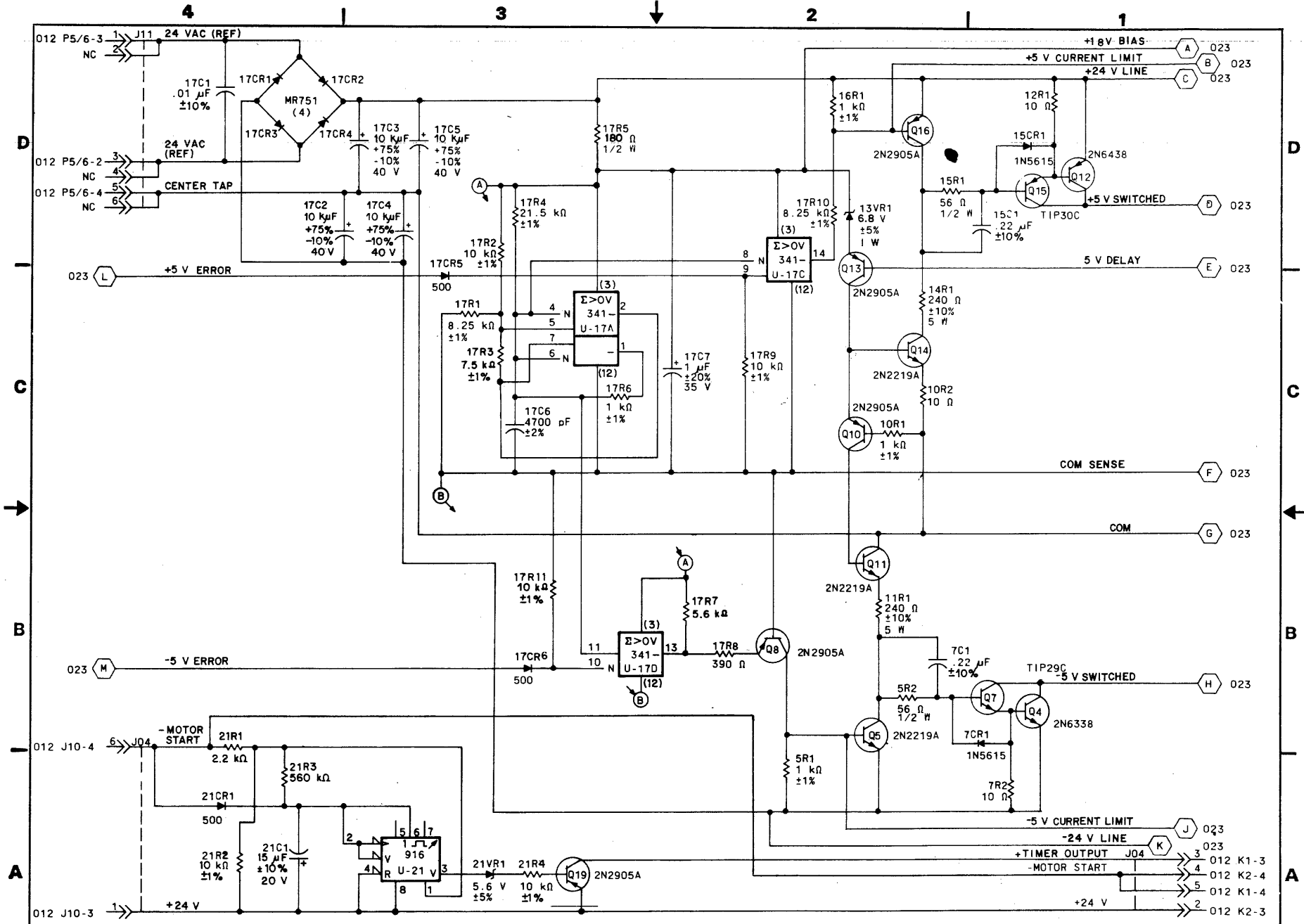
NONVANDAL OPERATIONS	C	83323150	N	B
CODE DEN 19333	CROSS REF NO	OH	SHEET 1 OF 2	PAGE 3-15

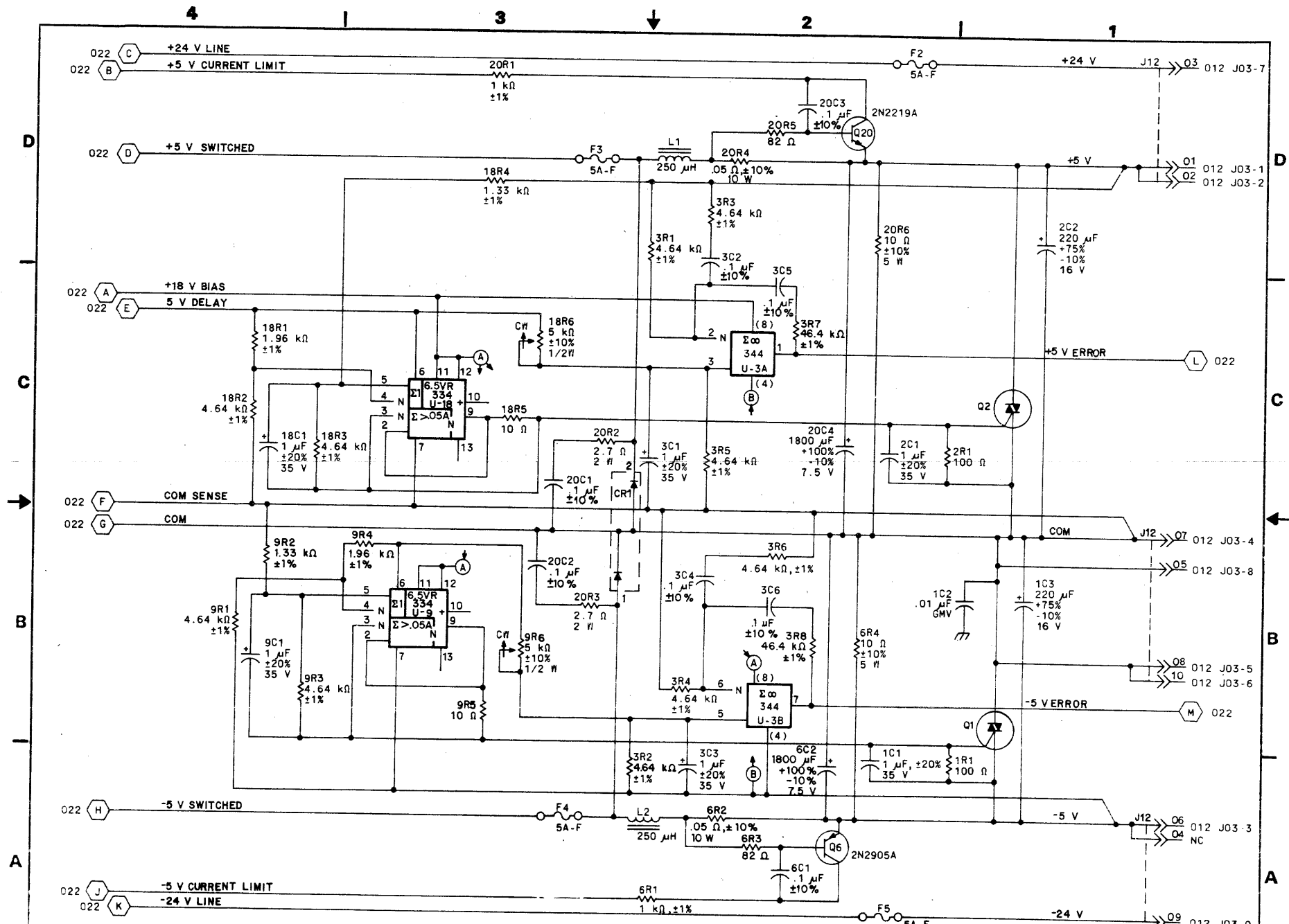
LOC: AI

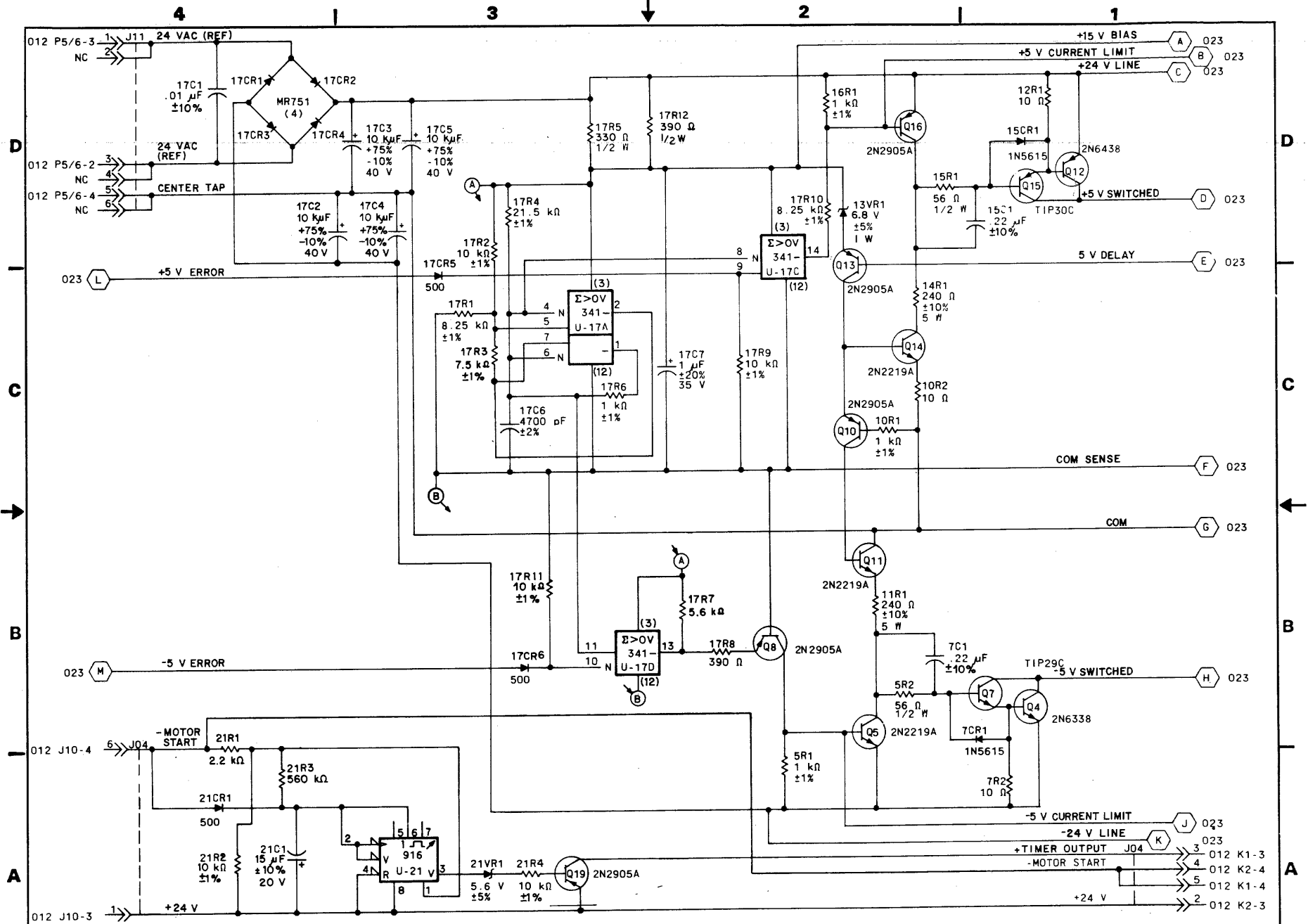


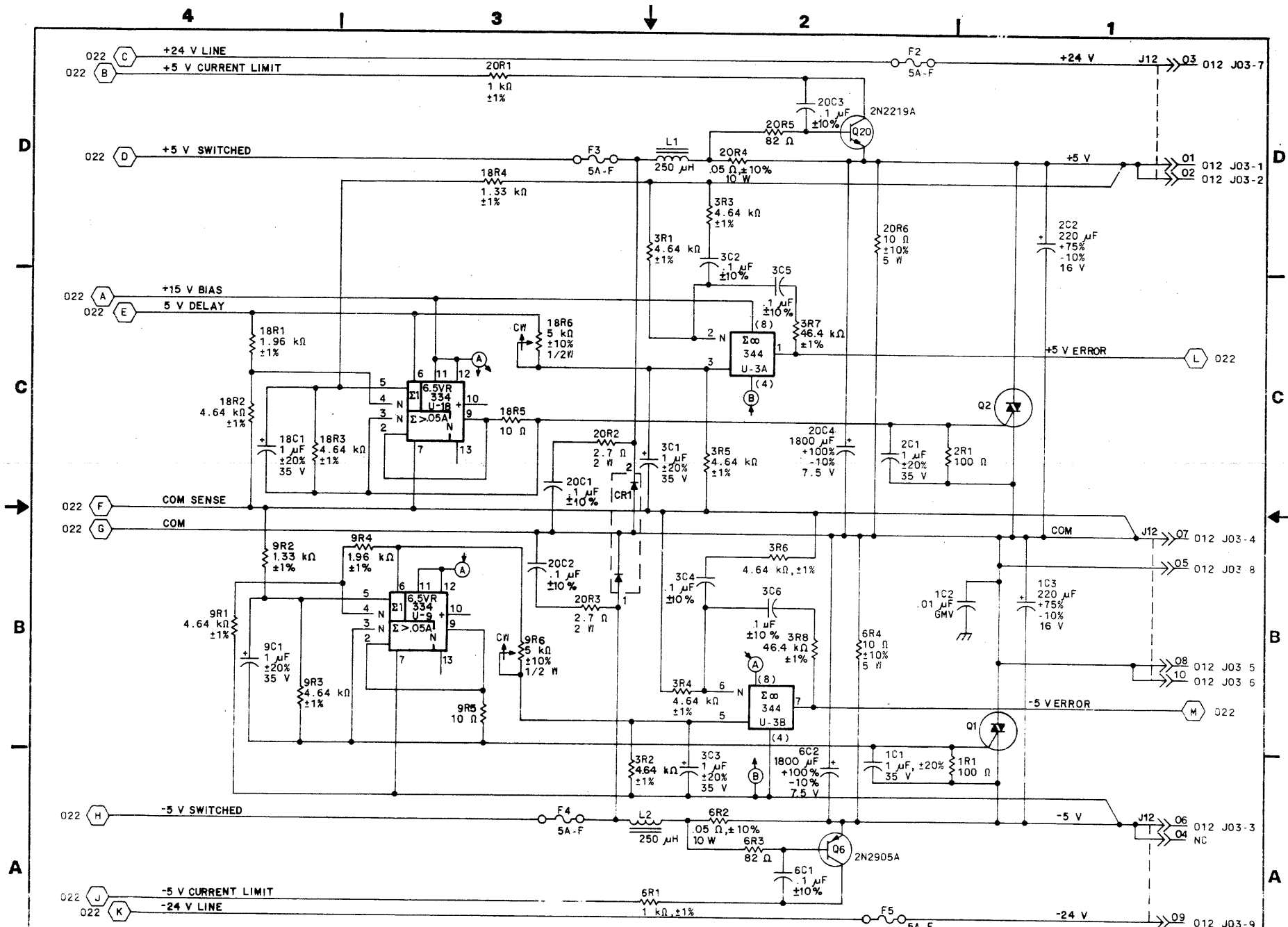
DC VOLT REG
 A1 A1
 -ZYV
 SEE CROSS
 REF NO 022/023/024
 FOR DETAILS

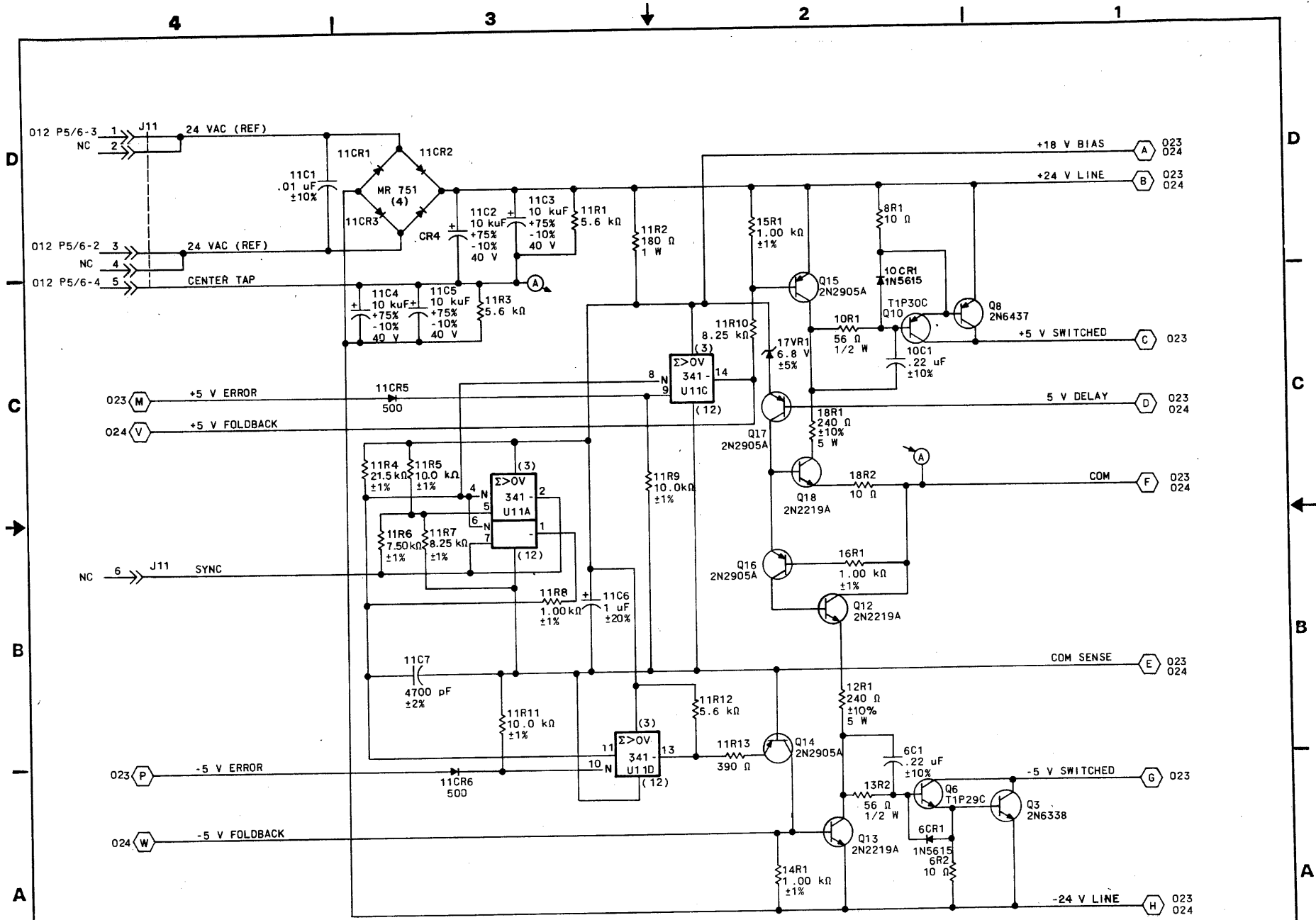
- NOTE:
- 1 INSTALL P05/6 AT J05 FOR 50 Hz.
INSTALL P05/6 AT J06 FOR 60 Hz.
 - 2 P07 SHOWN FOR 120 V - 60 Hz.
SEE CROSS REF 011 FOR ADDITIONAL INFORMATION.
 - 3 CONNECTIONS DEPEND ON SITE POWER.
 - 4 J13 FOR MANUFACTURING TEST ONLY



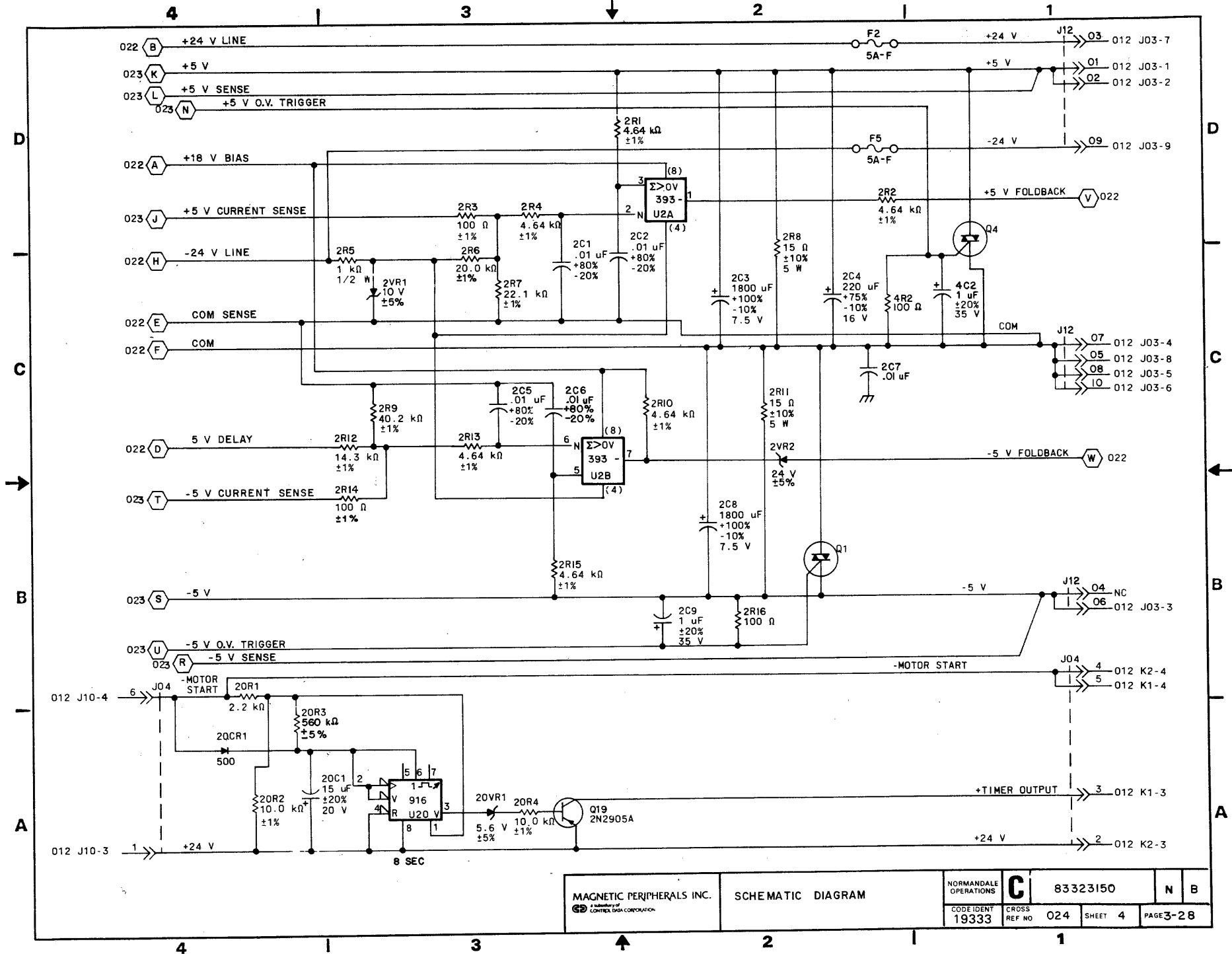


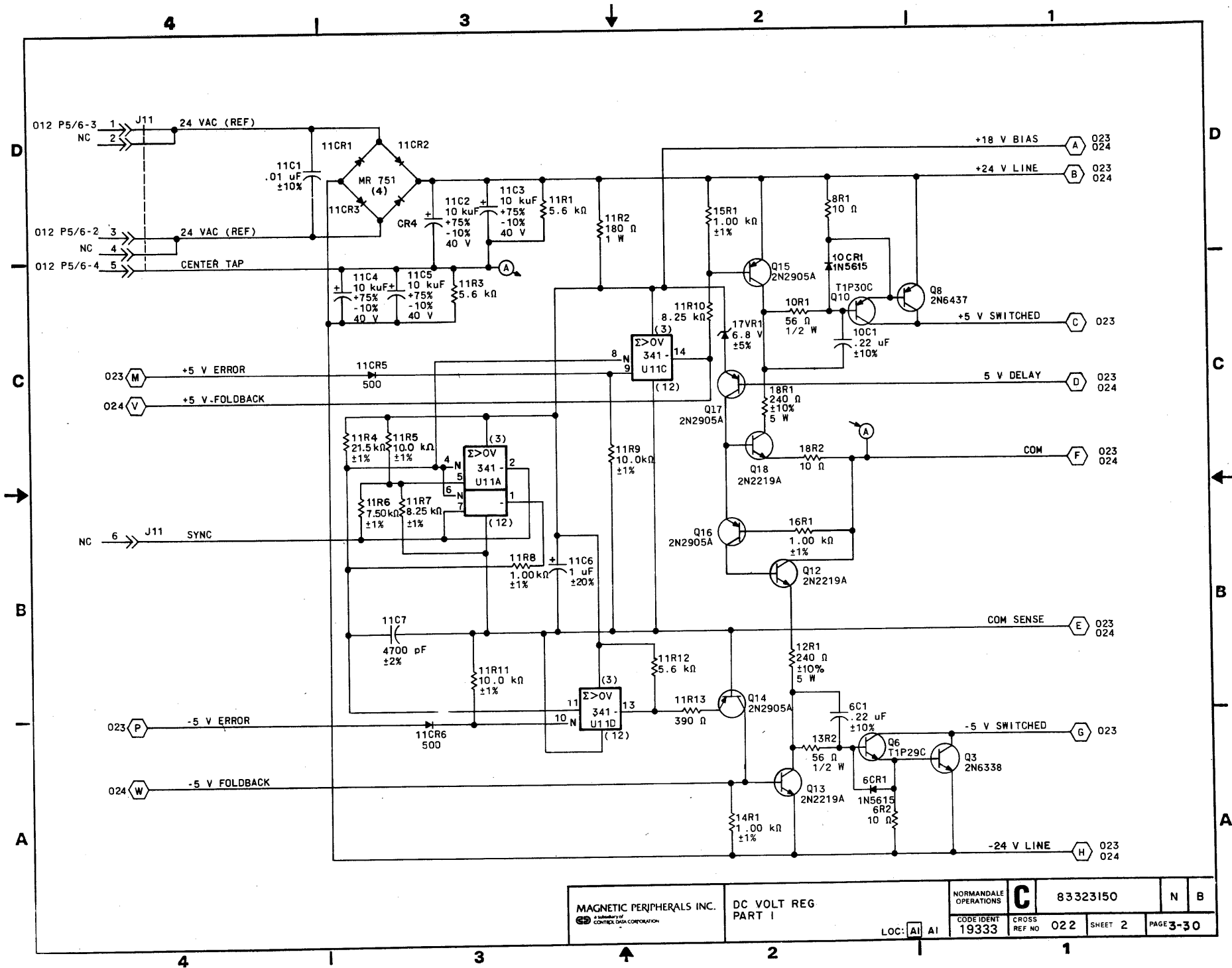


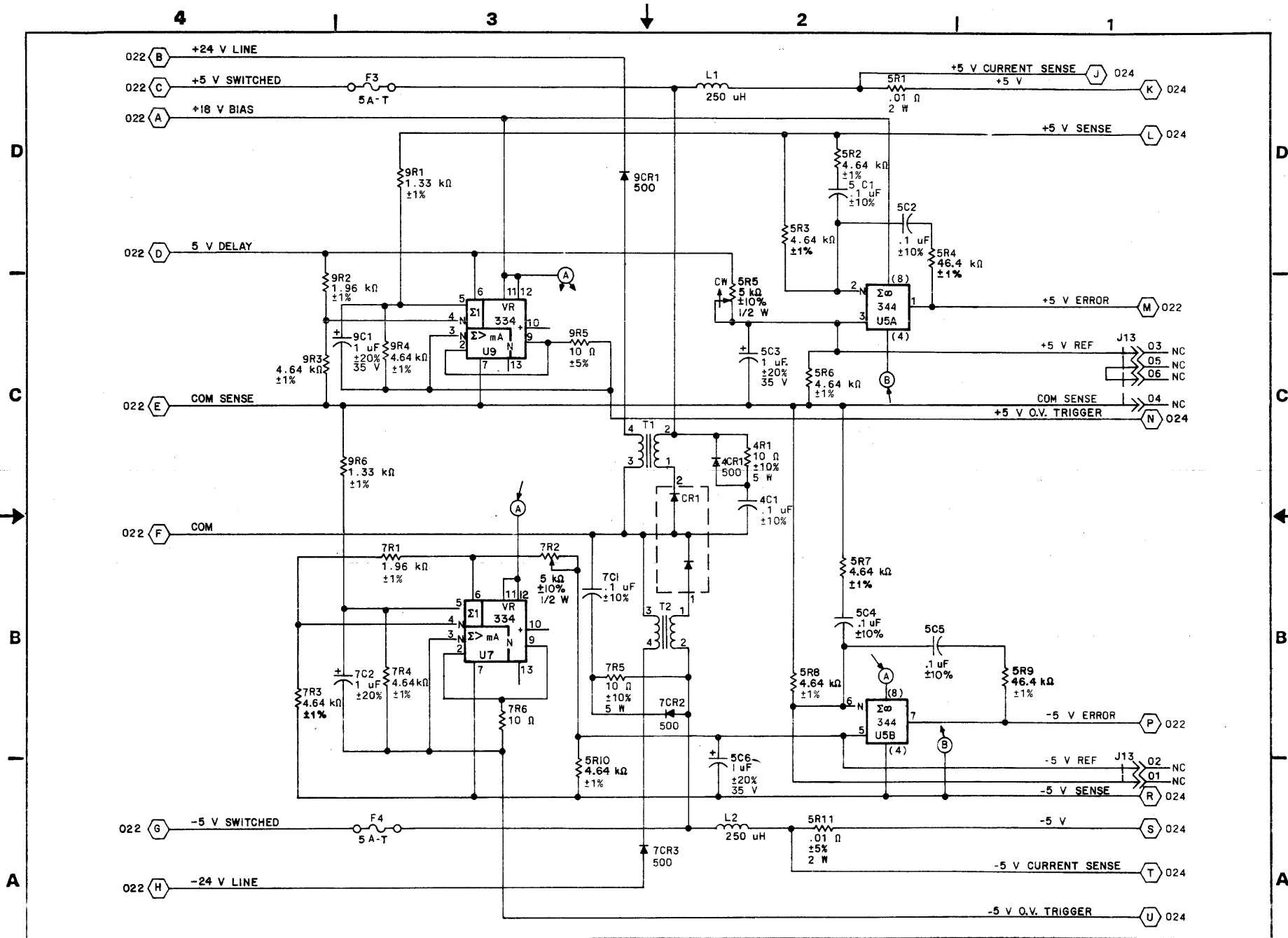




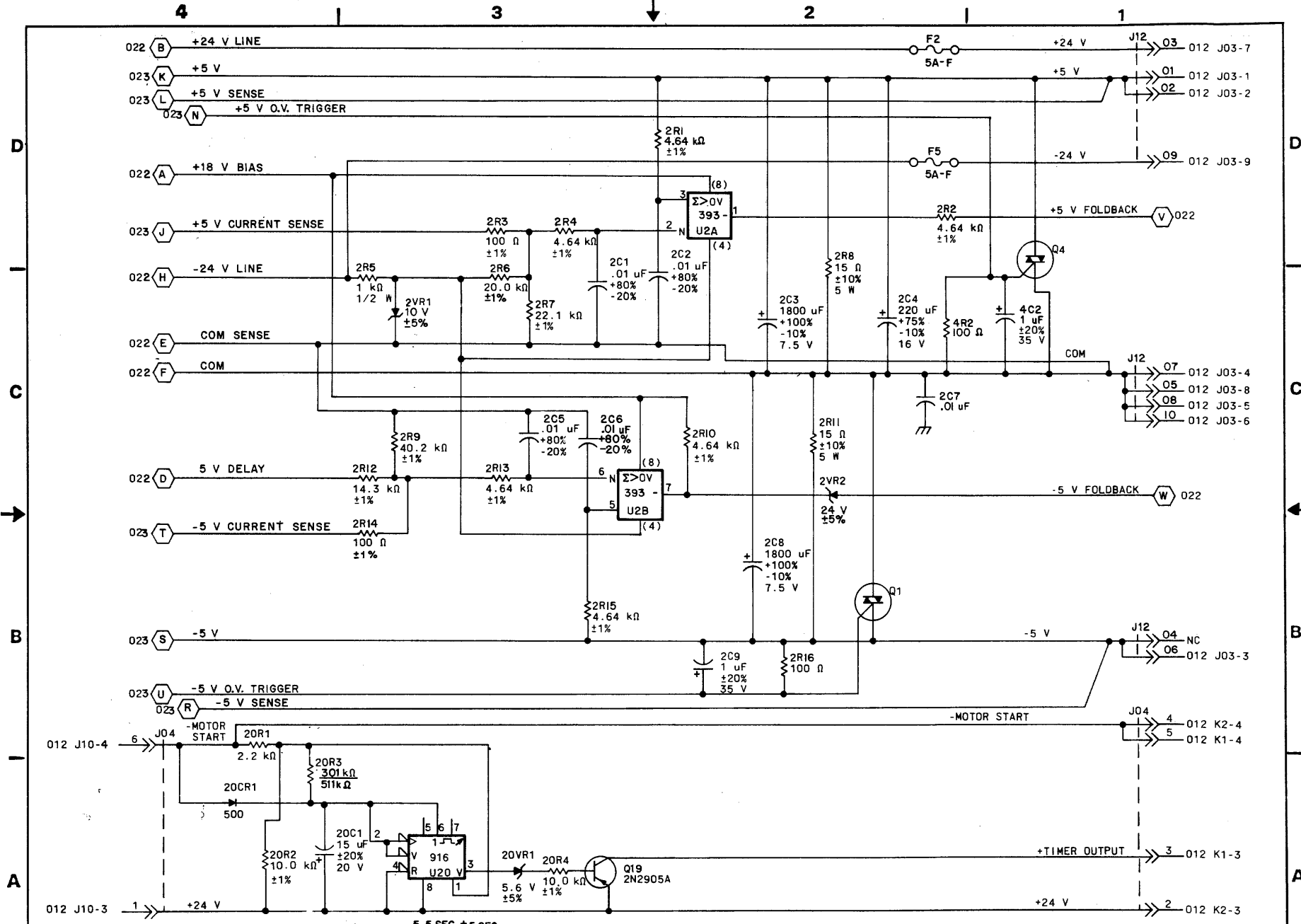
MAGNETIC PERIPHERALS INC. <small>a subsidiary of</small> CONTROL DATA CORPORATION	SCHEMATIC DIAGRAM		NORMANDALE OPERATIONS	83323150	N	B
	LOC: A1 A1	CODE IDENT 19333	CROSS REF NO 022	SHEET 2	PAGE 3-26	

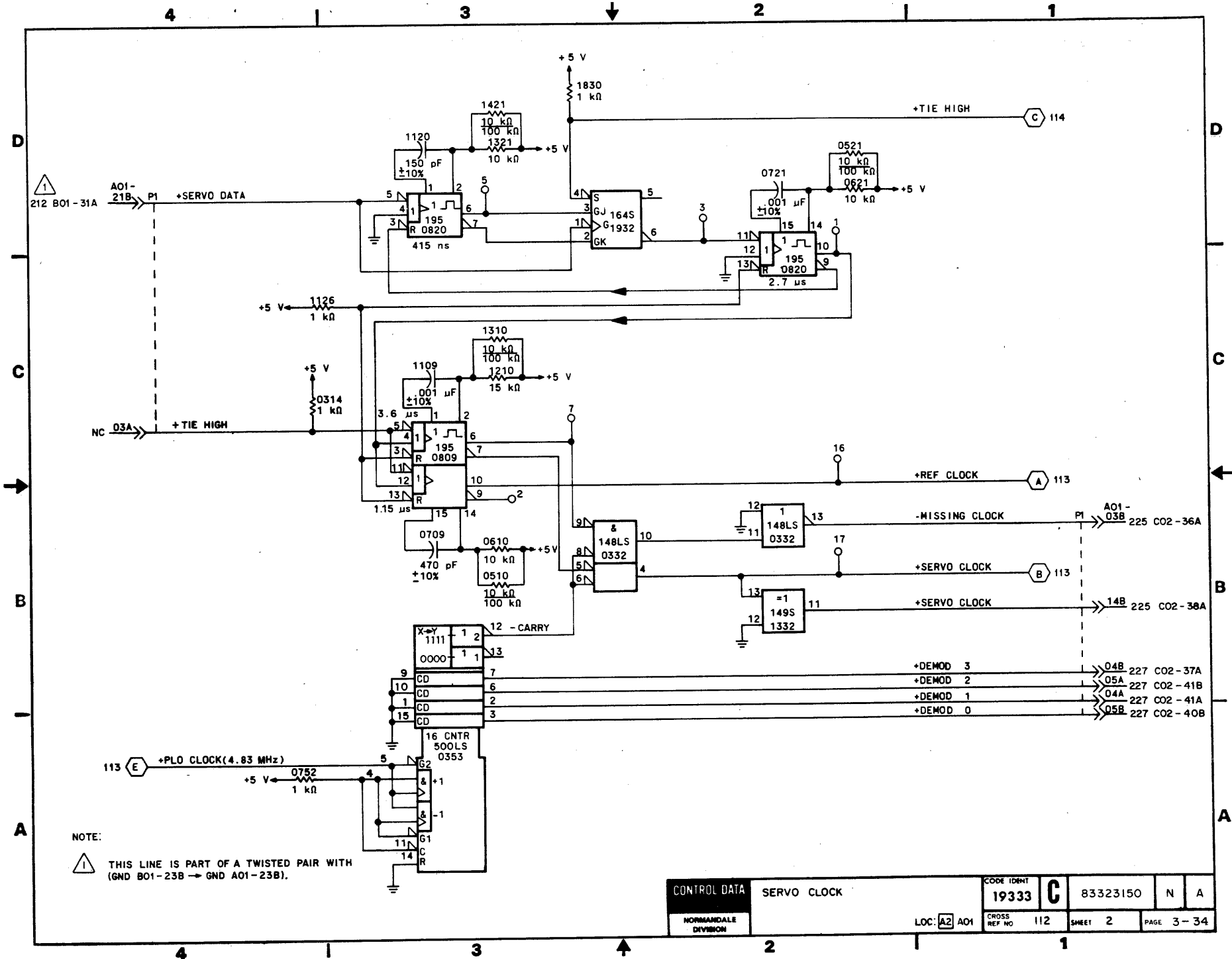




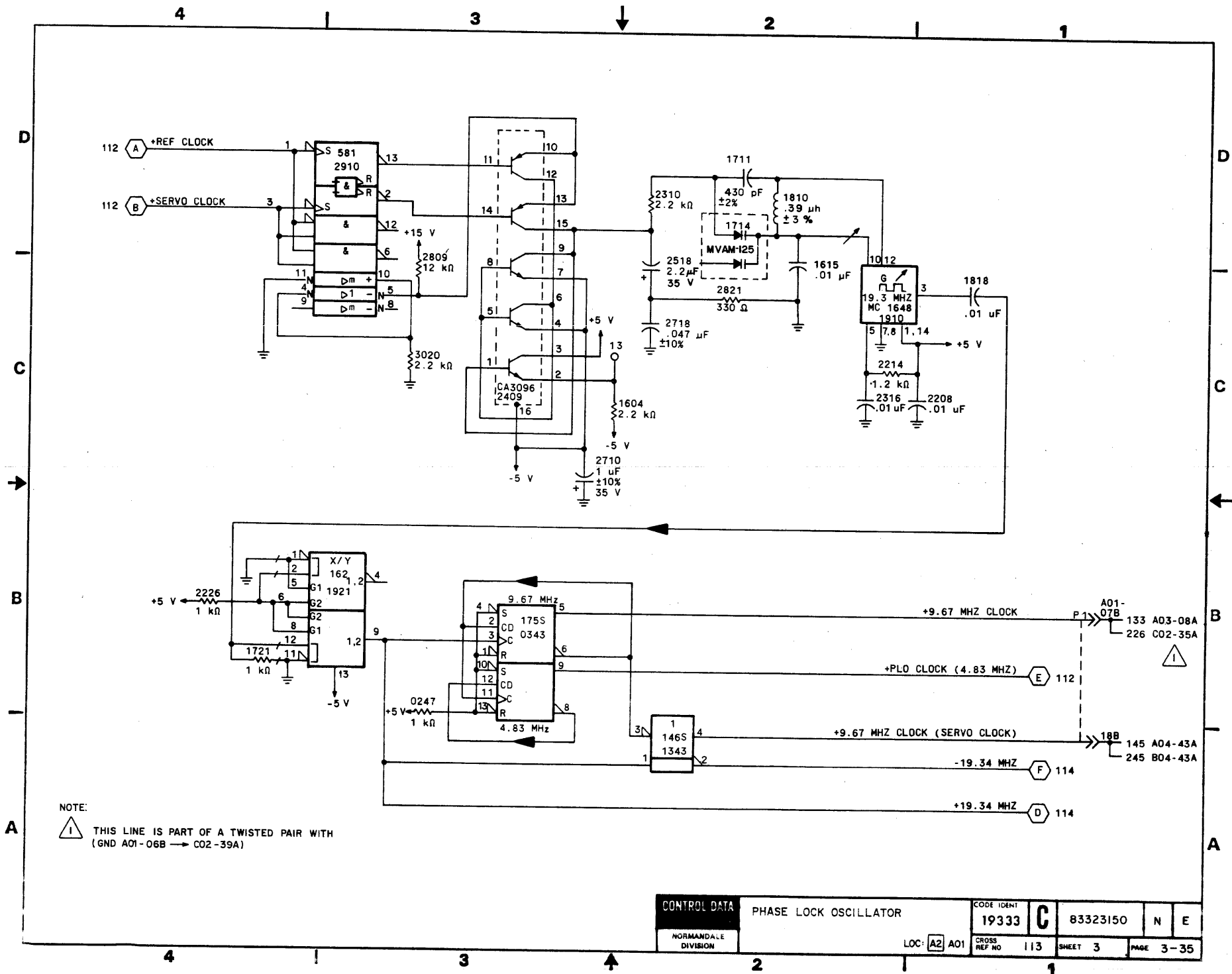


LOC: A1 A1



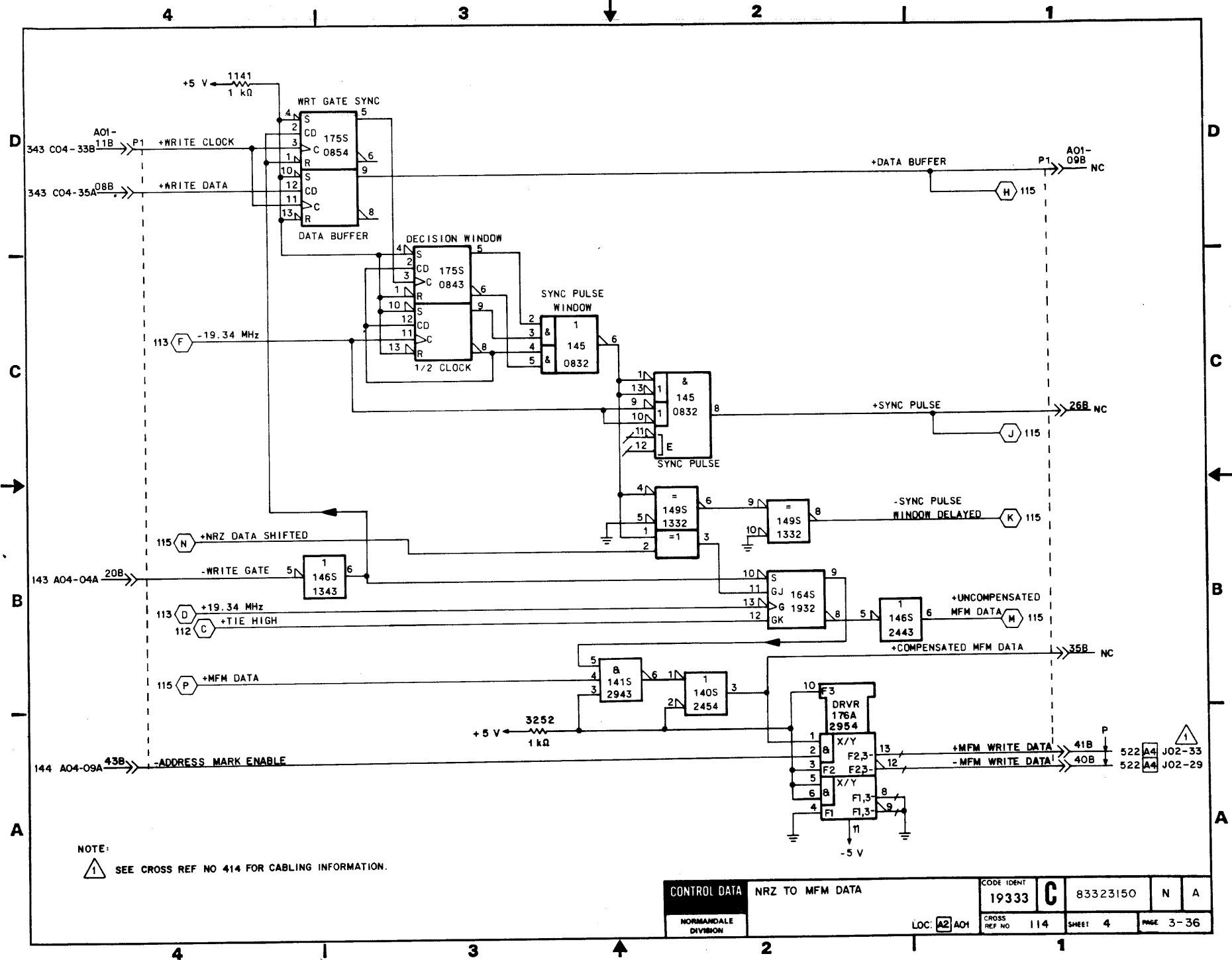


CONTROL DATA	SERVO CLOCK	CODE IDENT	C	83323150	N	A
		19333				
NORMANDEALE DIVISION	LOC: A2 A01	CROSS REF NO 112	SHEET 2	PAGE 3-34		



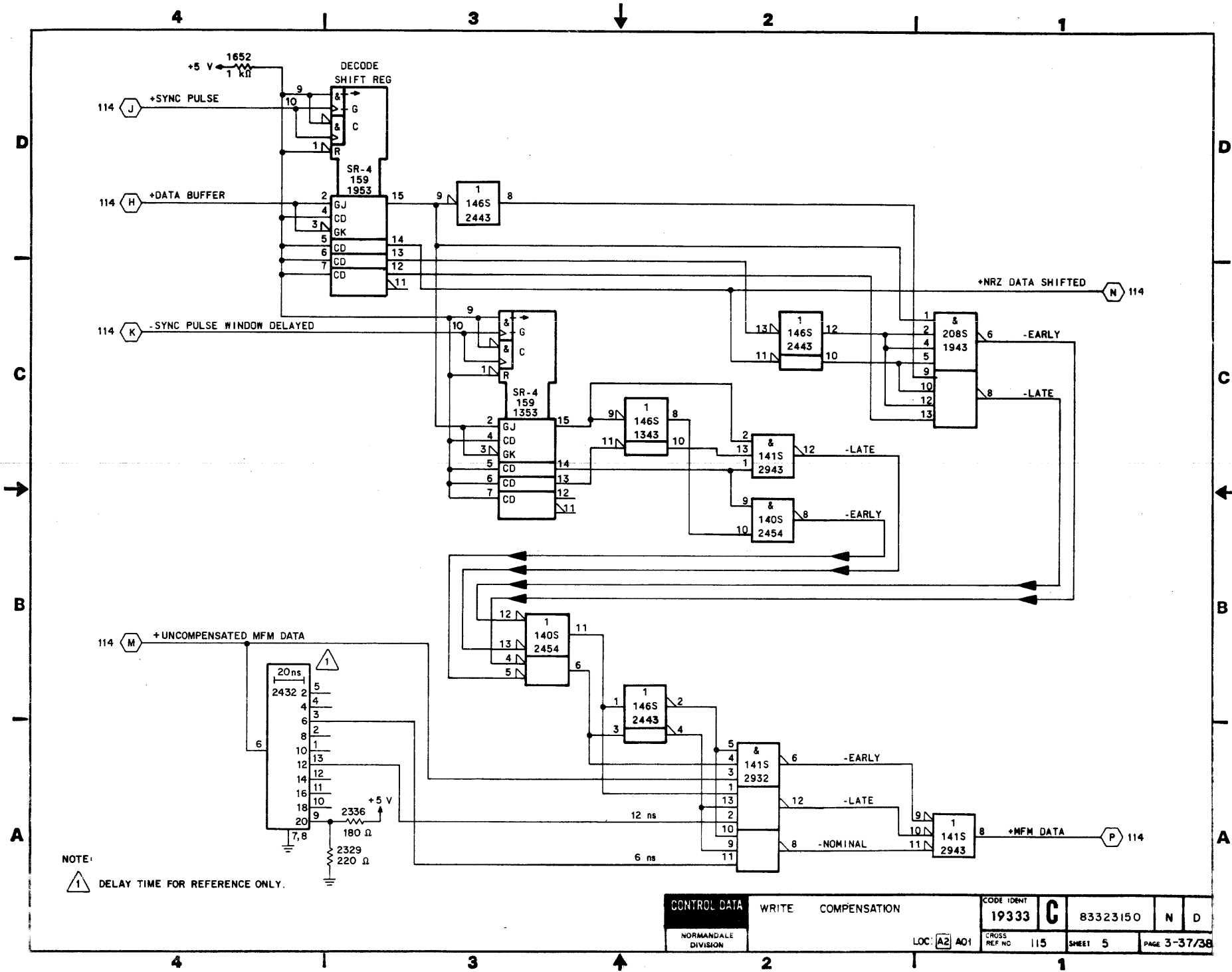
NOTE:
 ⚠ THIS LINE IS PART OF A TWISTED PAIR WITH
 (GND A01-06B → C02-39A)

CONTROL DATA		PHASE LOCK OSCILLATOR		CODE IDENT	C	83323150	N	E
NORMAN DALE DIVISION		LOC: A2 A01		CROSS REF. NO. 113				



NOTE:
 ⚠ SEE CROSS REF NO 414 FOR CABLING INFORMATION.

CONTROL DATA	NRZ TO MFM DATA	CODE IDENT	19333	C	83323150	N	A
		NORMANDEALE DIVISION	LOC: A2	AO1	CROSS REF NO 114	SHEET 4	PAGE 3-36



NOTE:
 1 DELAY TIME FOR REFERENCE ONLY.

CONTROL DATA	WRITE COMPENSATION	CODE IDENT	19333	C	83323150	N	D
	NORMANDEALE DIVISION	LOC: A2 A01	CROSS REF NO: 115	SHEET 5	PAGE 3-37/38		

REVISION STATUS OF SHEETS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A																
B	A	B	A																	
C	C	C	C																	
D	C	C	D																	
E	C	E	D																	
F	C	F	D																	
G	C	F	G																	
H	C	H	G																	
J	J	H	G																	
K	K	K	K																	

REVISIONS

REV.	ECO.	DESCRIPTION	DRFT.	DATE	CHK'D
A	PE23000	RELEASED			
B	PE50705	CORRECTIONS	TH	12-26-79	
C	PE50743A	REPLACE BPEX WITH EFEX	CB	3-28-80	
D	PE62290	CHANGE RESISTOR VALUE	MF	6-1-81	
E	PE62124	CHANGE DIODE	MF	6-1-81	
F	PE62124C	CHANGE CAPACITOR	DLN	8-17-81	
G	DJO2108	CHANGE RESISTOR AND CAPACITOR	DLN	9/30/81	
H	PE62124E	CHANGE INDUCTOR	MF	12-31-81	
J	DJO2251	CHANGE TRANSISTOR	MJ	3-2-82	
K	DJO2488	NEW EFEX BOARD BLANK	MJ	7-18-83	

UNUSED LOGIC ELEMENTS



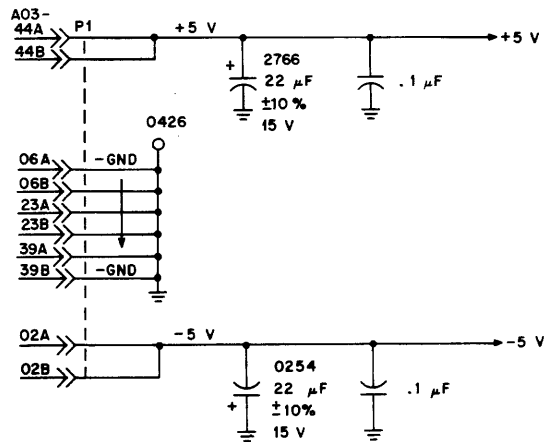
ELEMENT	LOCATION	OUTPUT PIN(S)
203LS	2943	10, 12
148LS	2443	10
10125	1942	13
195L	2909	6, 7
10124	1353	1, 2, 3, 4
10102	0320	14
10102	0853	3

NOTES:



UNUSED TTL LOGIC ELEMENT INPUT PINS ARE GROUNDED.

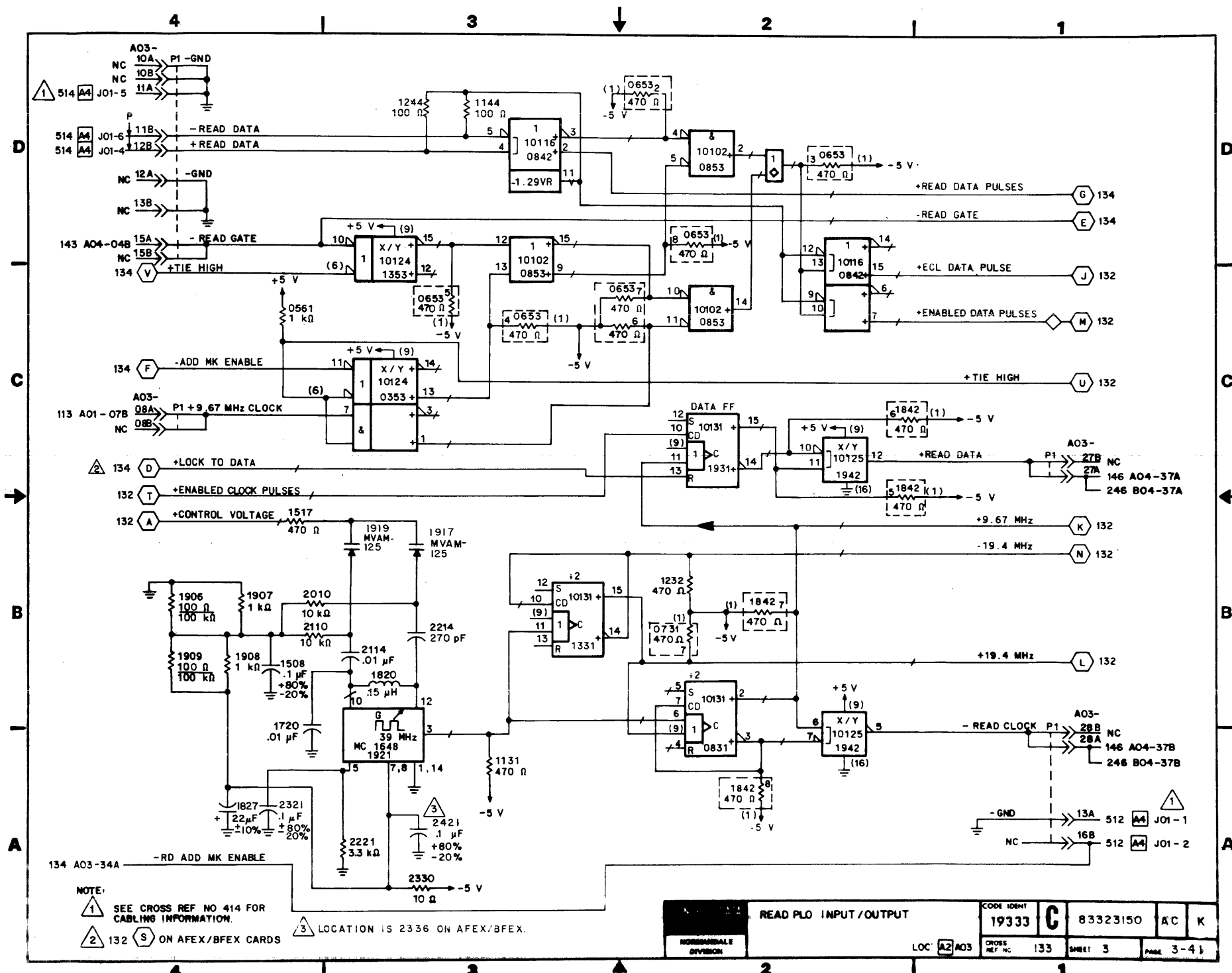
- UNLESS OTHERWISE SPECIFIED: ALL ECL IC'S IN THIS DIAGRAM HAVE -5 V ON PIN 8 AND GND ON PINS 1 AND 16.



.1 µF FILTER CAPS

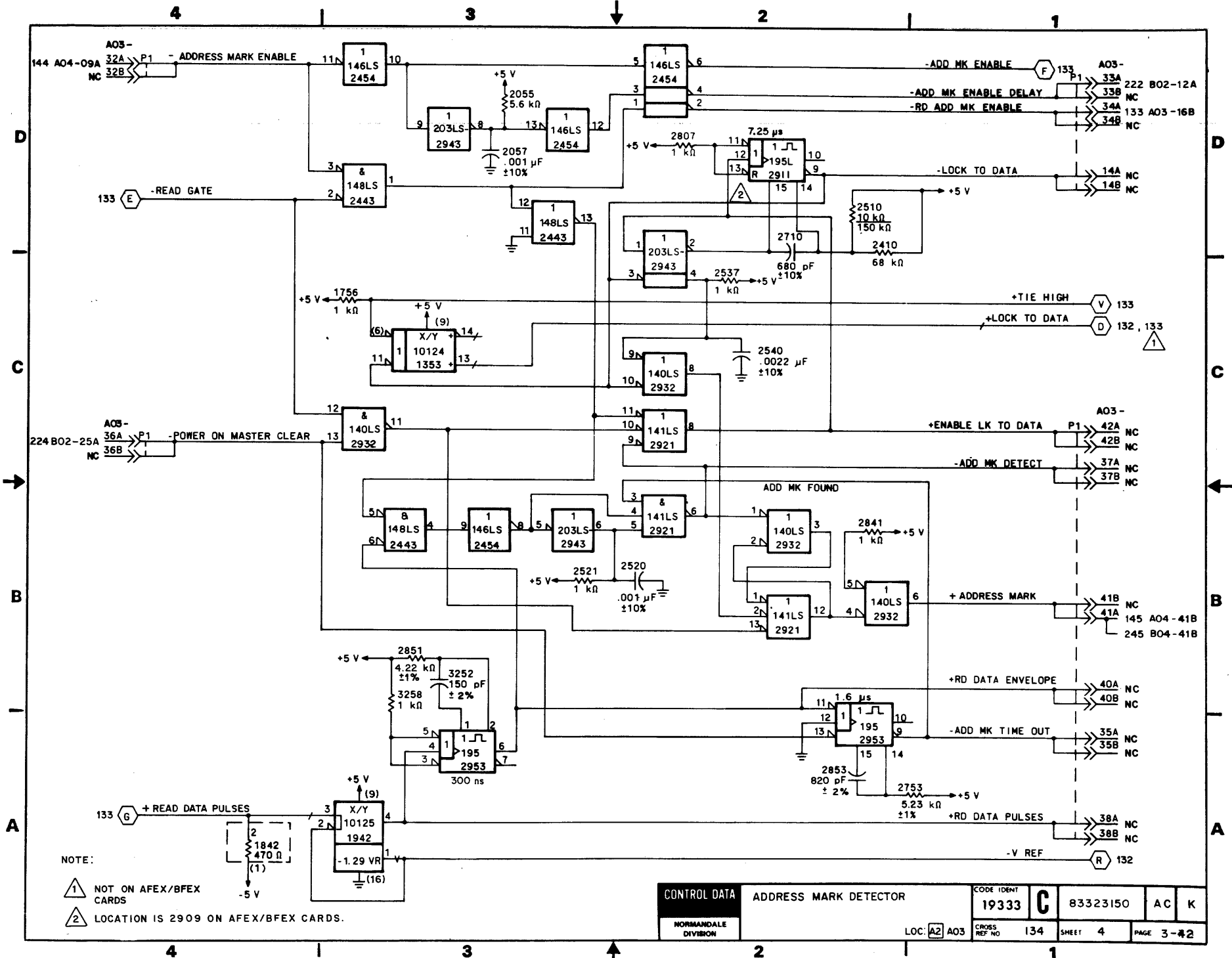
+5 V	-5 V
1854	0635
0362	1137
2843	1736
2522	1429
2310	1344
2434	1643
	1655

DRAWN	<i>[Signature]</i>	4-9-79	CONTROL DATA	READ PLO DIAGRAMS A/B/EFEX	CODE IDENT	19333	C	83323150	AC	K
CHECKED					CROSS REF NO	131	SHEET	1 of 4	PAGE	3-39
ENGINEER			NORMAN DALE DIVISION	TYPE A/B/EFEX	LOC	A2	AO2			
APPROVED										



NOTE:
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.
 2 132 (S) ON AFEX/BFEX CARDS
 3 LOCATION IS 2336 ON AFEX/BFEX.

NONREPLACABLE DIVISION		READ PLO INPUT/OUTPUT		CODE IDENT	83323150	AC	K
				19333	C		
LOC	A2	A03	CROSS REF NC	133	SHEET	3	PAGE 3-4



NOTE:

- 1 NOT ON AFEX/BFEX CARDS
- 2 LOCATION IS 2909 ON AFEX/BFEX CARDS.

CONTROL DATA		ADDRESS MARK DETECTOR		CODE IDENT	19333	C	83323150	AC	K
NORMANDEALE DIVISION				CROSS REF NO	134	SHEET	4	PAGE 3-42	
		LOC: A2 A03							

REVISION STATUS OF SHEETS																					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
A	A	A	A	A	A	A															
B	B	A	A	A	A	A															
C	C	A	A	A	A	A															

REVISIONS					
REV.	ECO.	DESCRIPTION	DWFT.	DATE	CHK'D
A	PE23000	RELEASED			
B	PE42238	CHANGE IC FAMILY	CB	3-21-80	
C	DJ02075	CHANGE IC	DLM	9/30/81	

UNUSED RESISTOR PACKS

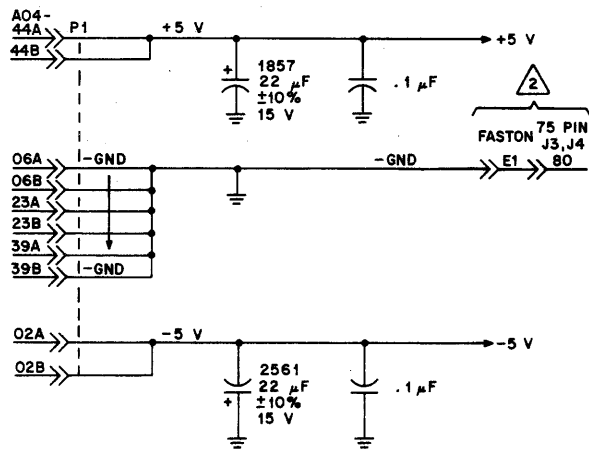
LOCATION	PINS
0264	4,7
1014	4,7,8
1026	6
1044	5,7,8
1054	3,7,8

UNUSED LOGIC ELEMENTS

ELEMENT	LOCATION	OUTPUT PIN(S)
175LS	0228	5,6

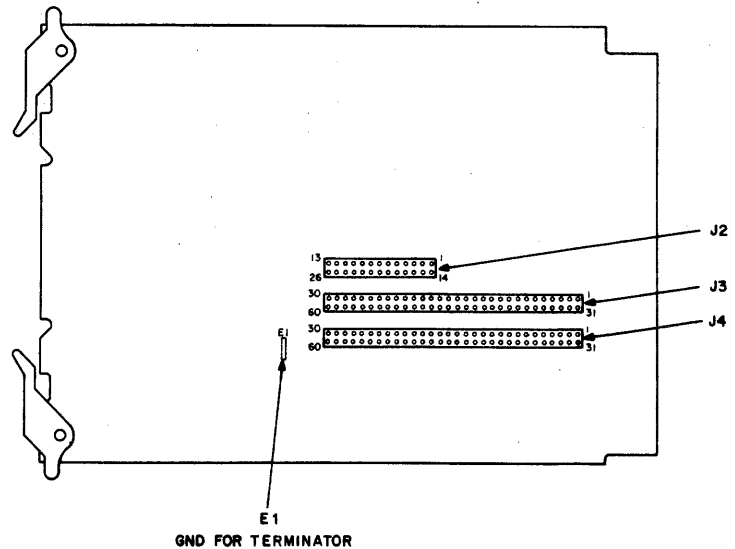
NOTES:

- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

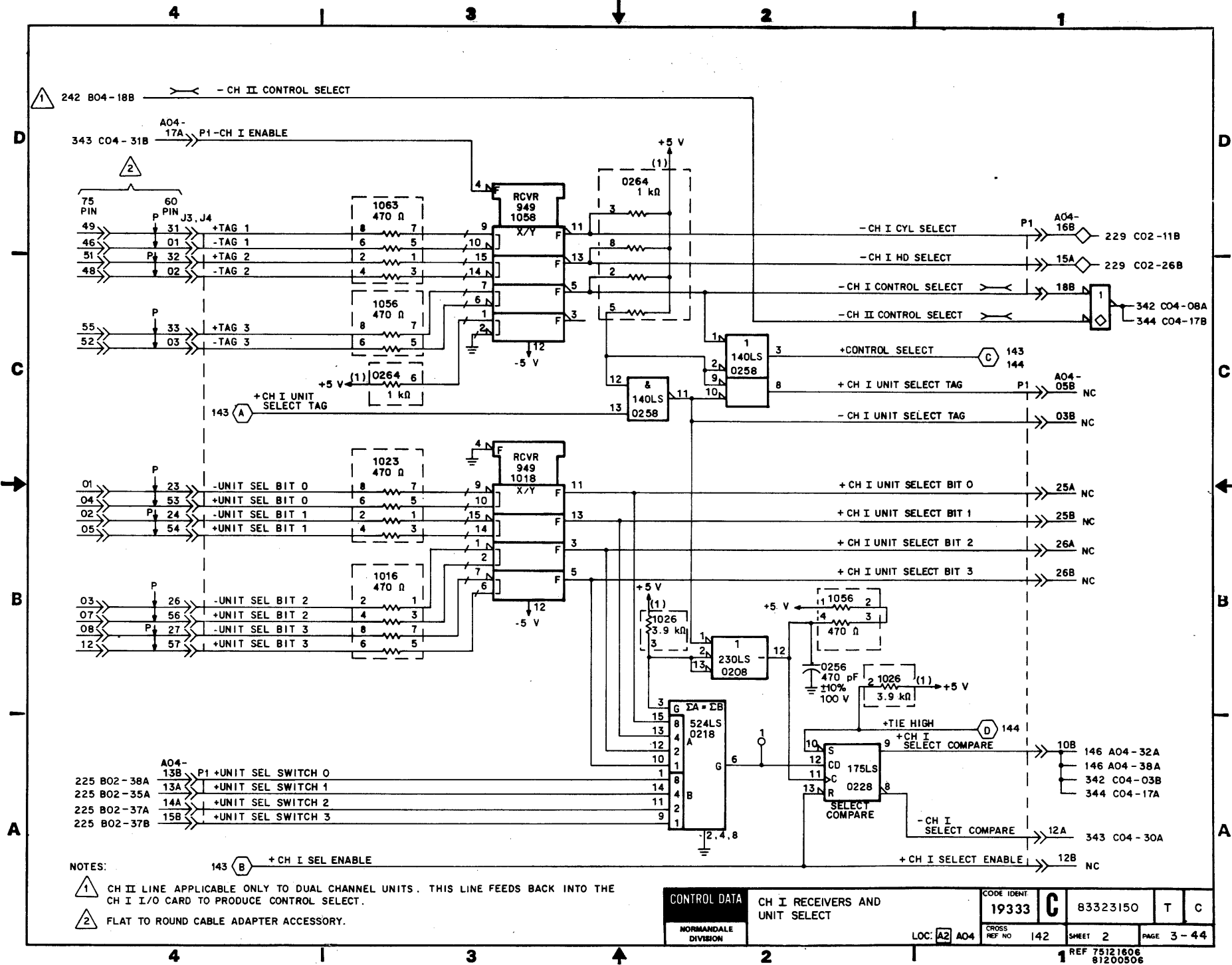


.1 µF FILTER CAPS

+5 V	-5 V
0214	1012
0226	1122
0235	1032
0245	1042
0255	1147
1015	1262
1025	2812
1035	2822
1145	2830
1155	2837
2814	2845
2823	2855
2831	
2838	
2846	
2854	



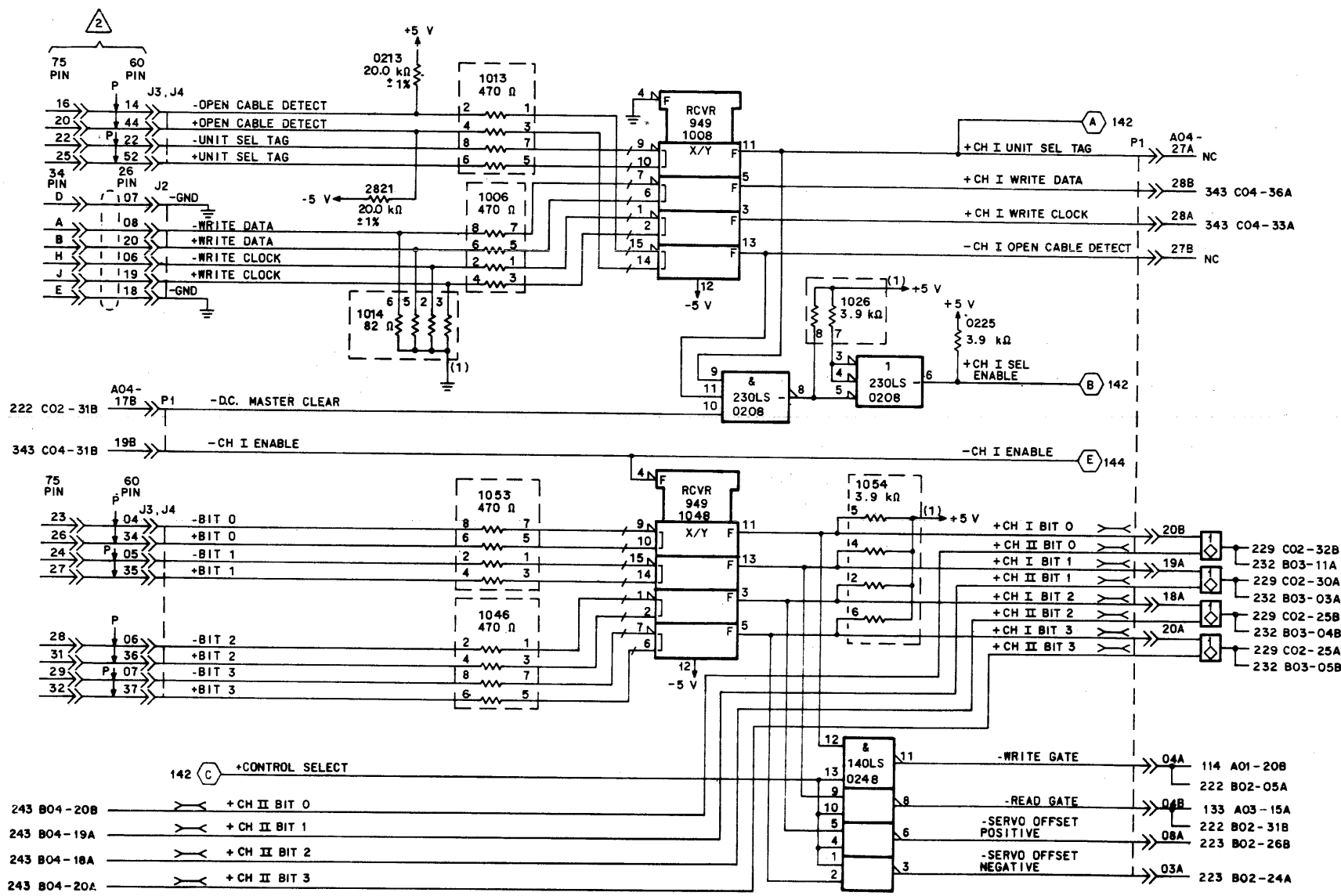
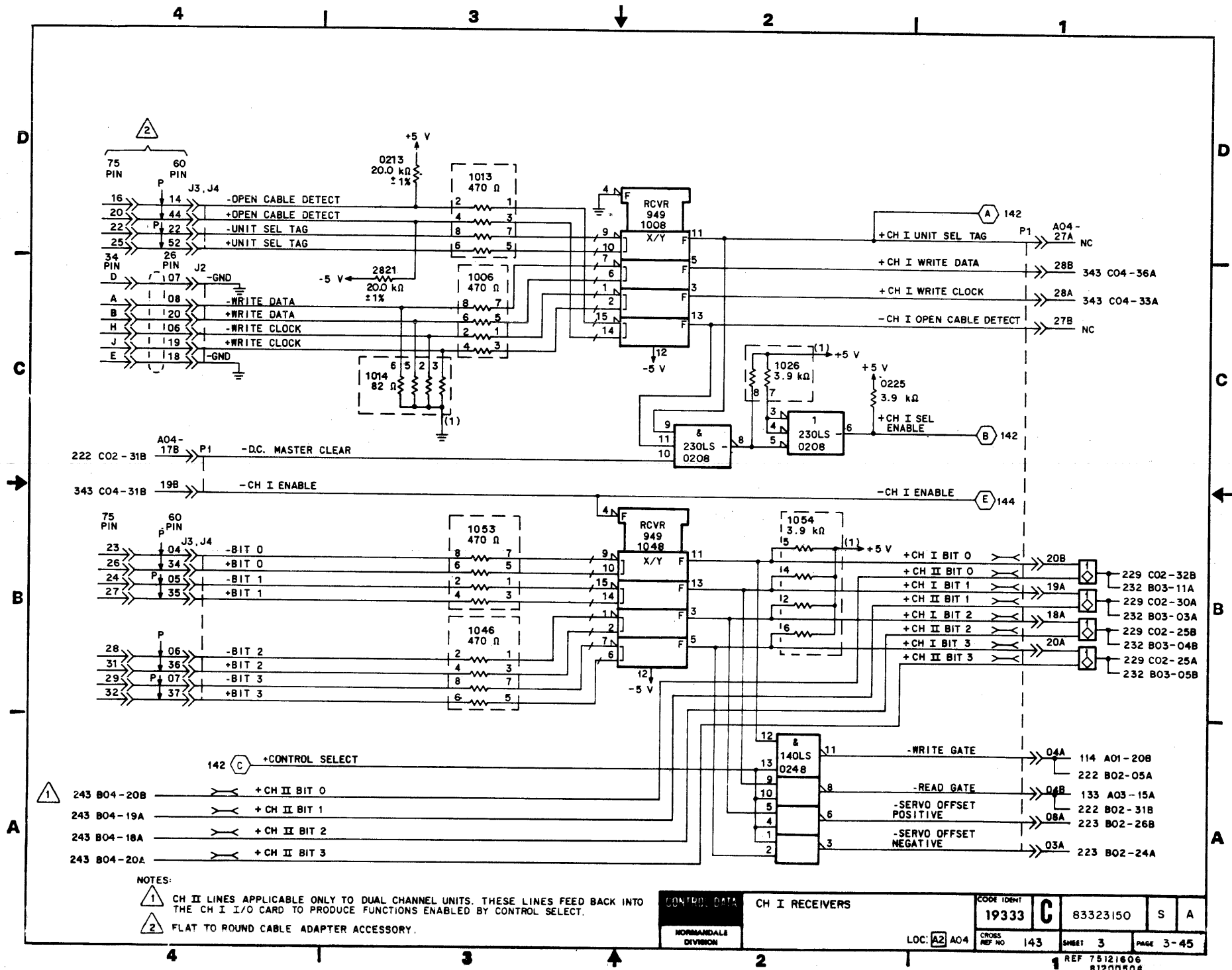
DRAWN	G. BROWN	U-277	CONTROL DATA	CHANNEL I I/O	CODE IDENT	19333	C	83323150	T	C
CHECKED				DIAGRAMS	CROSS REF NO	141	SHEET	1 of 6	PAGE	3-43
ENGINEER	G. BROWN	6/17/79	NORMAN DALE	TYPE: CFAX	LOC:	A2	A04			
APPROVED			DIVISION							



NOTES: 143 (A) +CH I SEL ENABLE

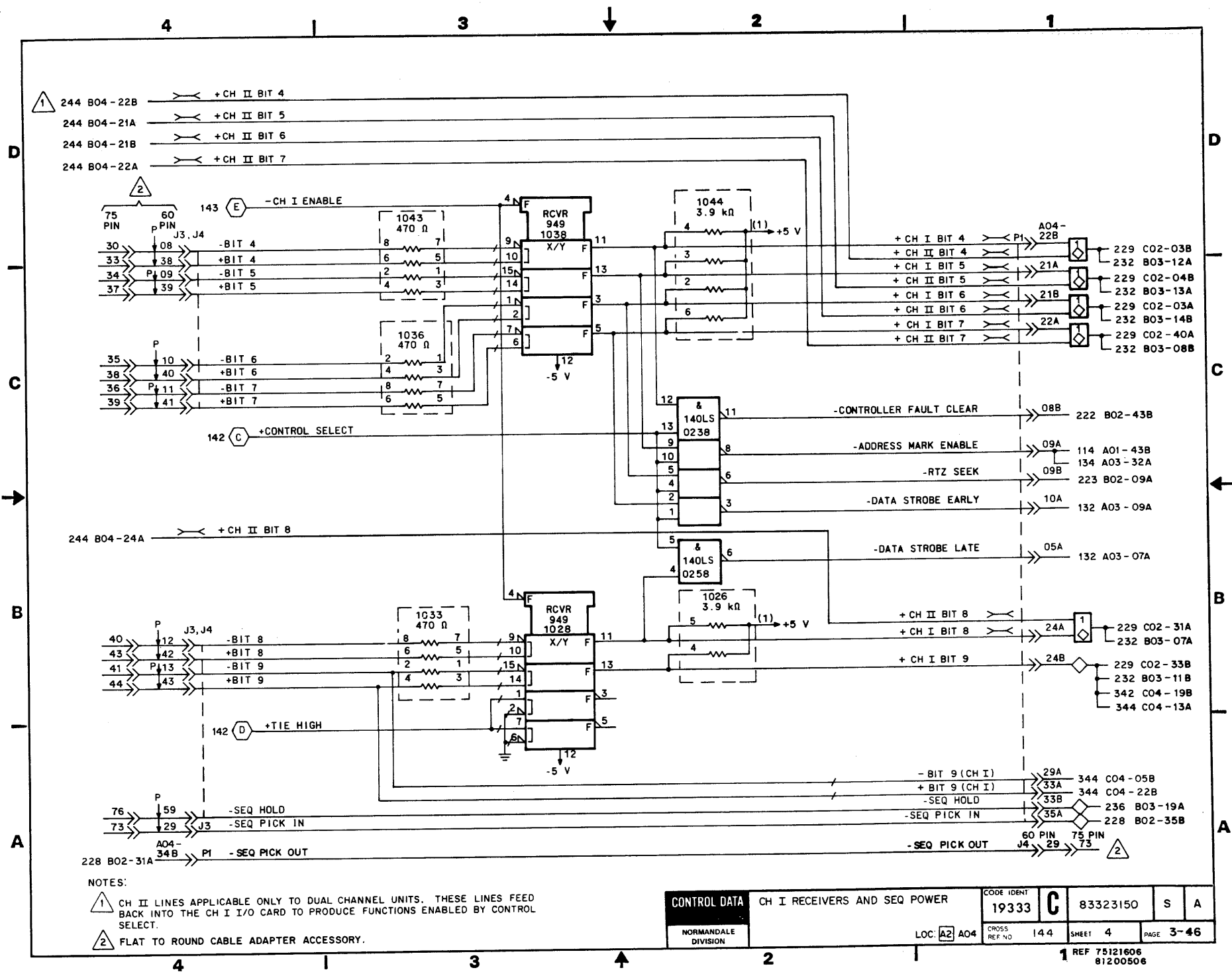
- 1 CH II LINE APPLICABLE ONLY TO DUAL CHANNEL UNITS. THIS LINE FEEDS BACK INTO THE CH I I/O CARD TO PRODUCE CONTROL SELECT.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA	CH I RECEIVERS AND UNIT SELECT		CODE IDENT	19333	C	83323150	T	C
	NORMANDEALE DIVISION	LOC: A2 A04	CROSS REF NO	142	SHEET	2	PAGE	3-44



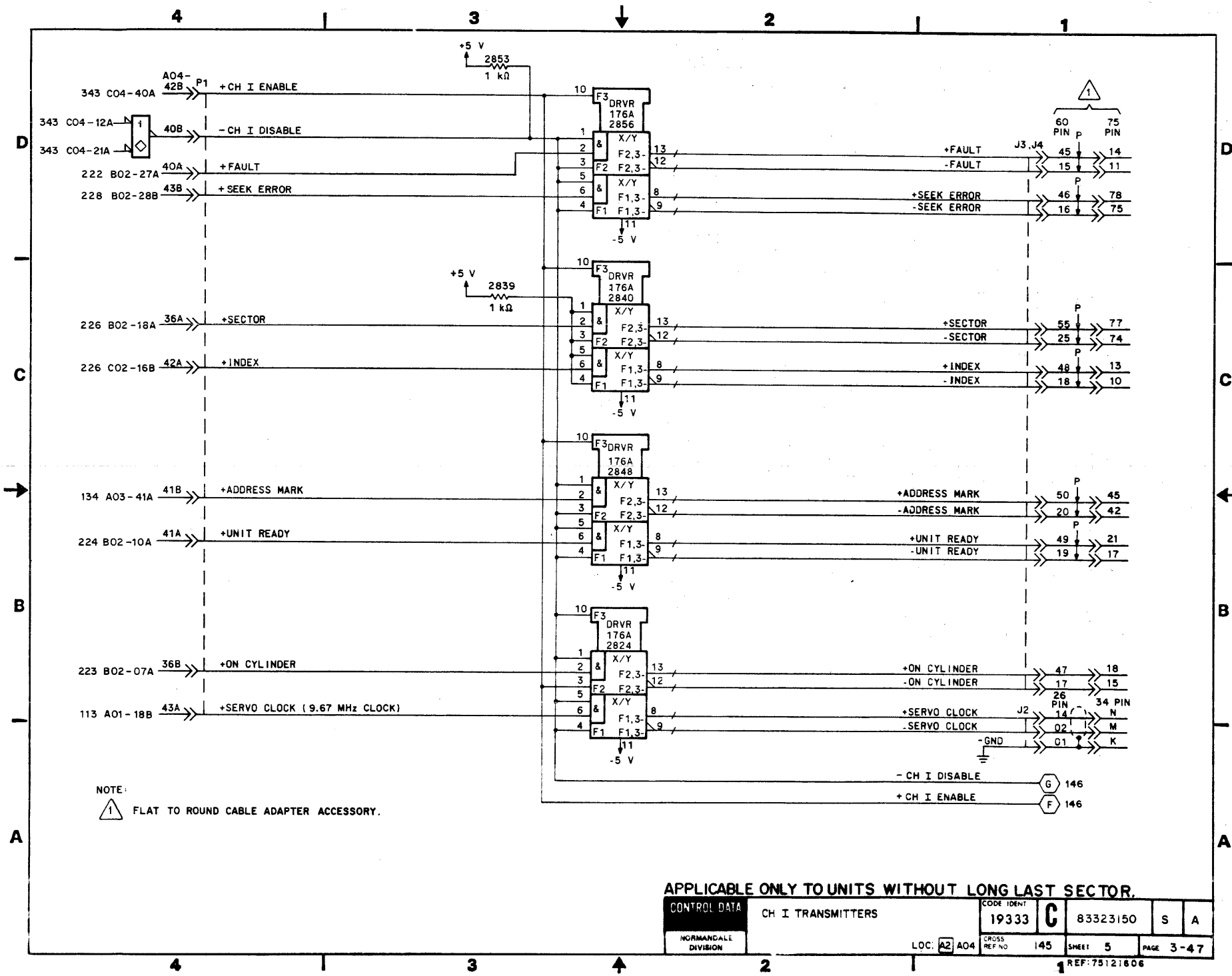
NOTES:
 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA		CH I RECEIVERS		CODE IDENT	83323150	S	A
NORMAN DALE DIVISION		LOC: A2 A04		19333 C	83323150	S	A
		CROSS REF NO	143	SHEET	3	PAGE	3-45
		REF 75121606		81200508			



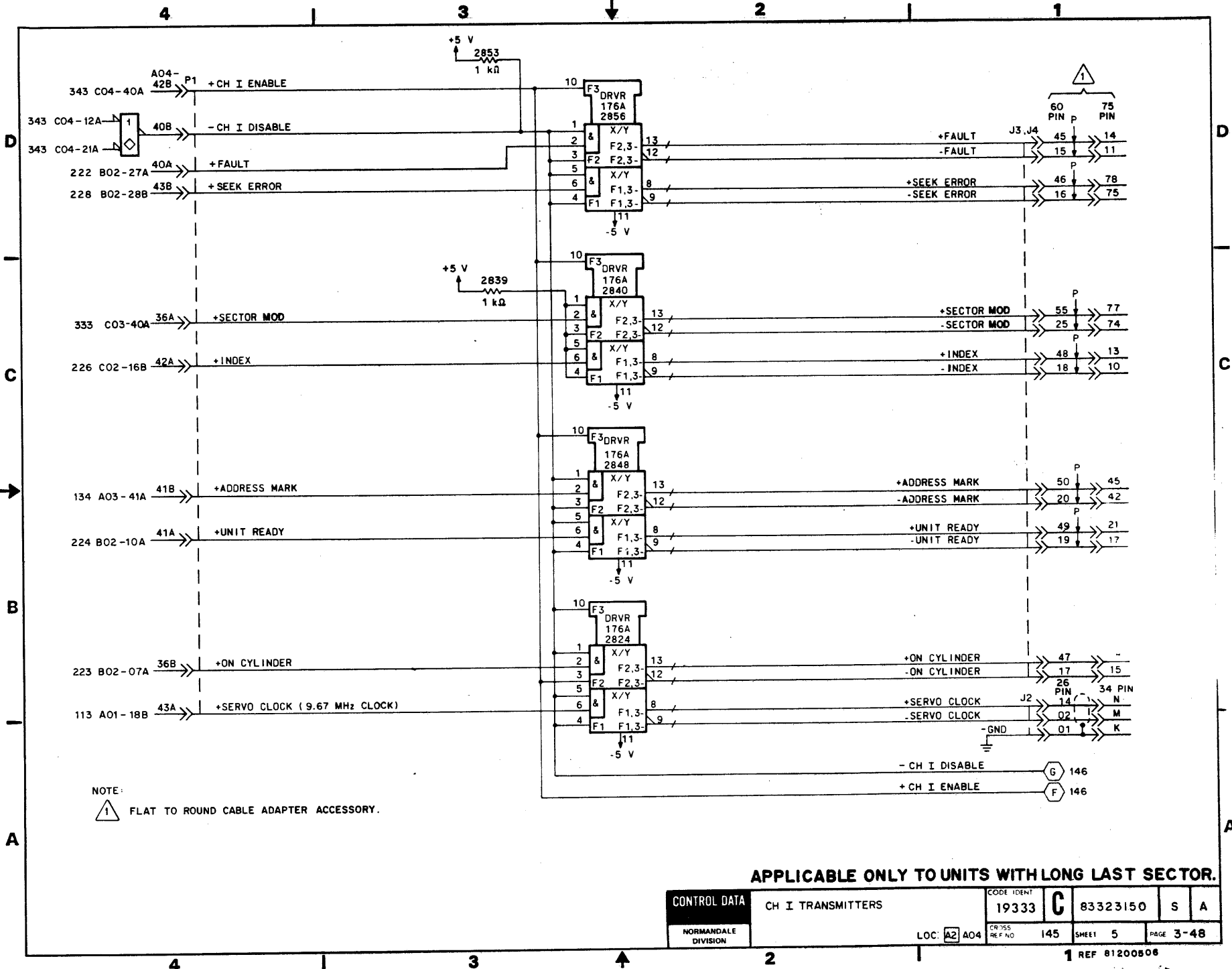
NOTES:
 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA	CH I RECEIVERS AND SEQ POWER		CODE IDENT	C	83323150	S	A
			19333				
NORMANDEALE DIVISION	LOC: A2	A04	CROSS REF NO: 144	SHEET: 4	PAGE: 3-46		



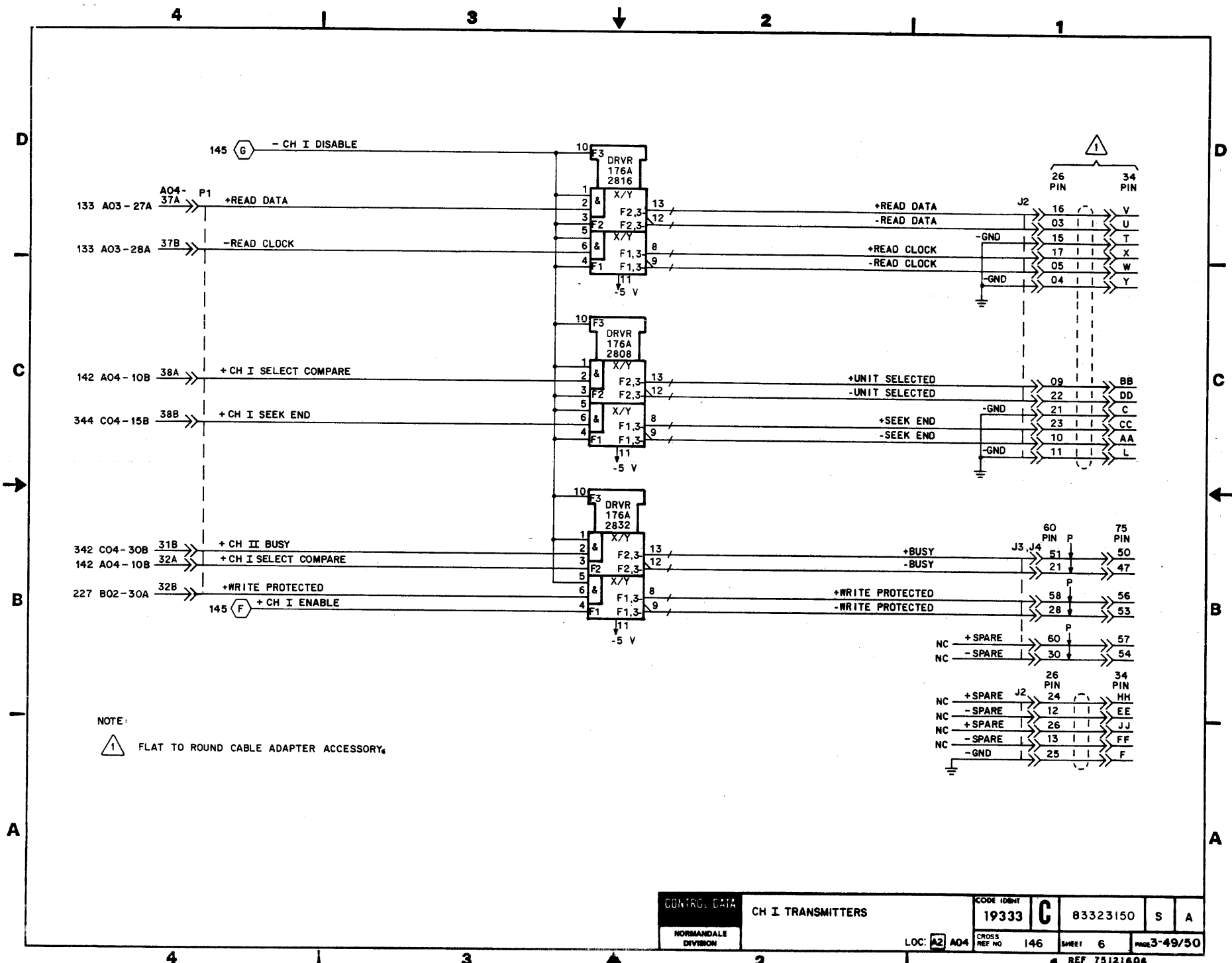
APPLICABLE ONLY TO UNITS WITHOUT LONG LAST SECTOR.

CONTROL DATA	CH I TRANSMITTERS	CODE IDENT	C	83323150	S	A	
		19333					
NORMANDEALE DIVISION	LOC: A2 A04	CROSS REF NO	145	SHEET	5	PAGE	3-47



CONTROL DATA	CH I TRANSMITTERS		CODE IDENT	19333 C		83323150	S	A
	NORMANDEALE DIVISION	LOC: A2 A04	CROSS REF NO	145	SHEET	5	PAGE	3-48

APPLICABLE ONLY TO UNITS WITH LONG LAST SECTOR.



REVISION STATUS OF SHEETS																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A	A														
B	B	A	A	A	A														
C	B	A	A	C	A														
D	D	A	A	C	A														

REVISIONS				
REV.	ECO	DESCRIPTION	DRFT.	DATE
A	PE23000	RELEASED		
B	PE62165	CORRECTIONS	MF	1-12-81
C	PE62248	CORRECTIONS	MF	8-11-81
D	DJ02075	CHANGE IC	MF	12-31-81

UNUSED RESISTOR PACKS

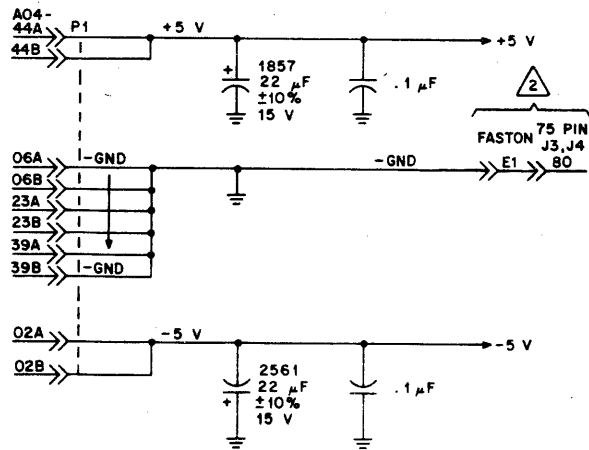
LOCATION	PINS
0264	4,7
1014	4,7,8
1026	6
1044	5,7,8
1054	3,7,8

UNUSED LOGIC ELEMENTS

ELEMENT	LOCATION	OUTPUT PINS
175LS	0228	5,6

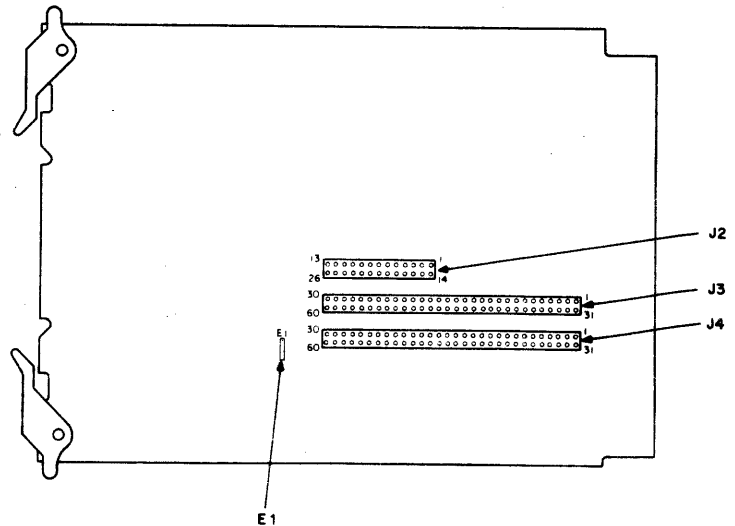
NOTES:

- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.



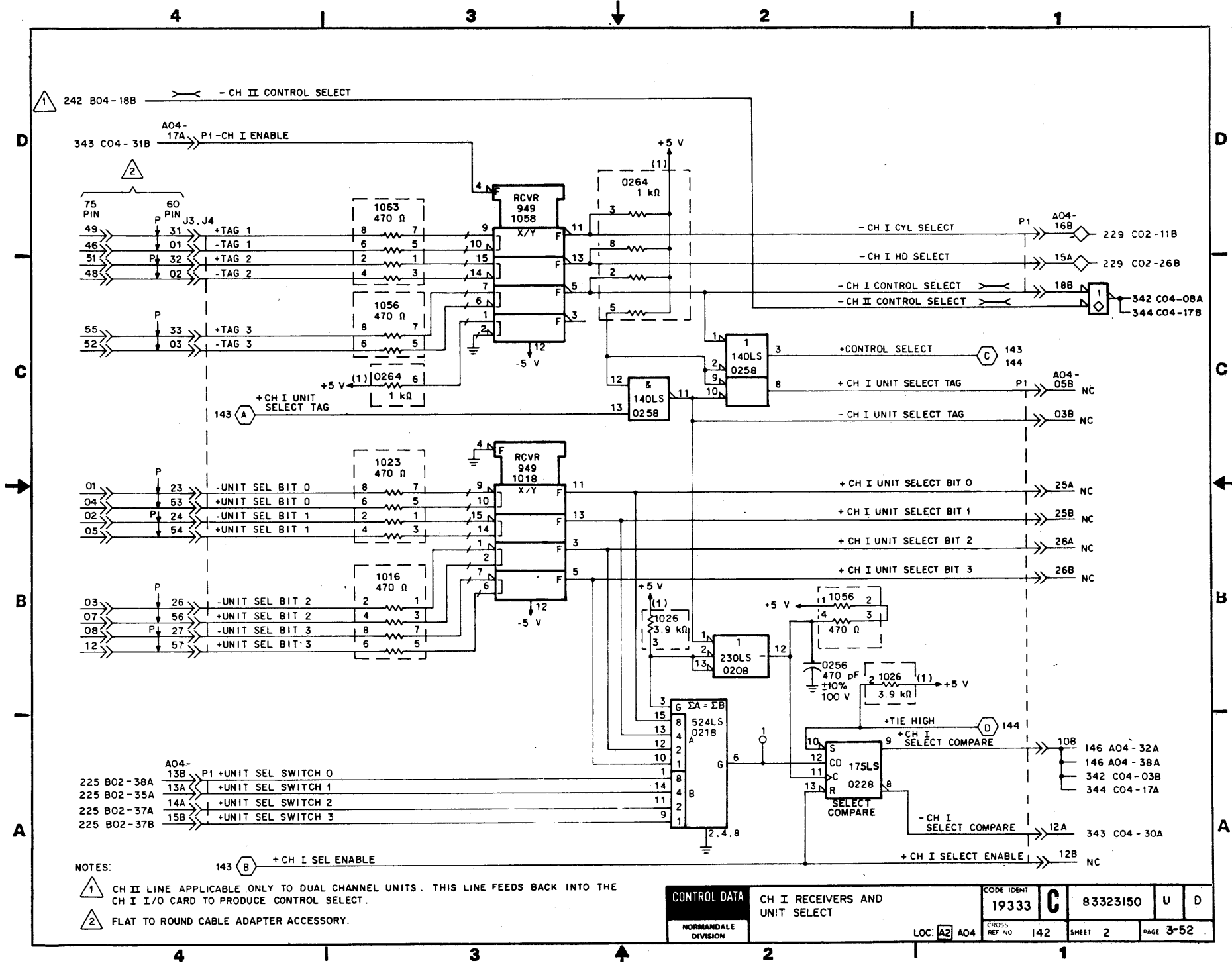
.1 µF FILTER CAPS

+5 V	-5 V
0214	1012
0226	1122
0235	1032
0245	1042
0255	1147
1015	1262
1025	2812
1035	2822
1145	2830
1155	2837
2814	2845
2823	2855
2831	
2838	
2846	
2854	



APPLICABLE ONLY TO UNITS WITHOUT CARRIAGE OFFSET CAPABILITY.

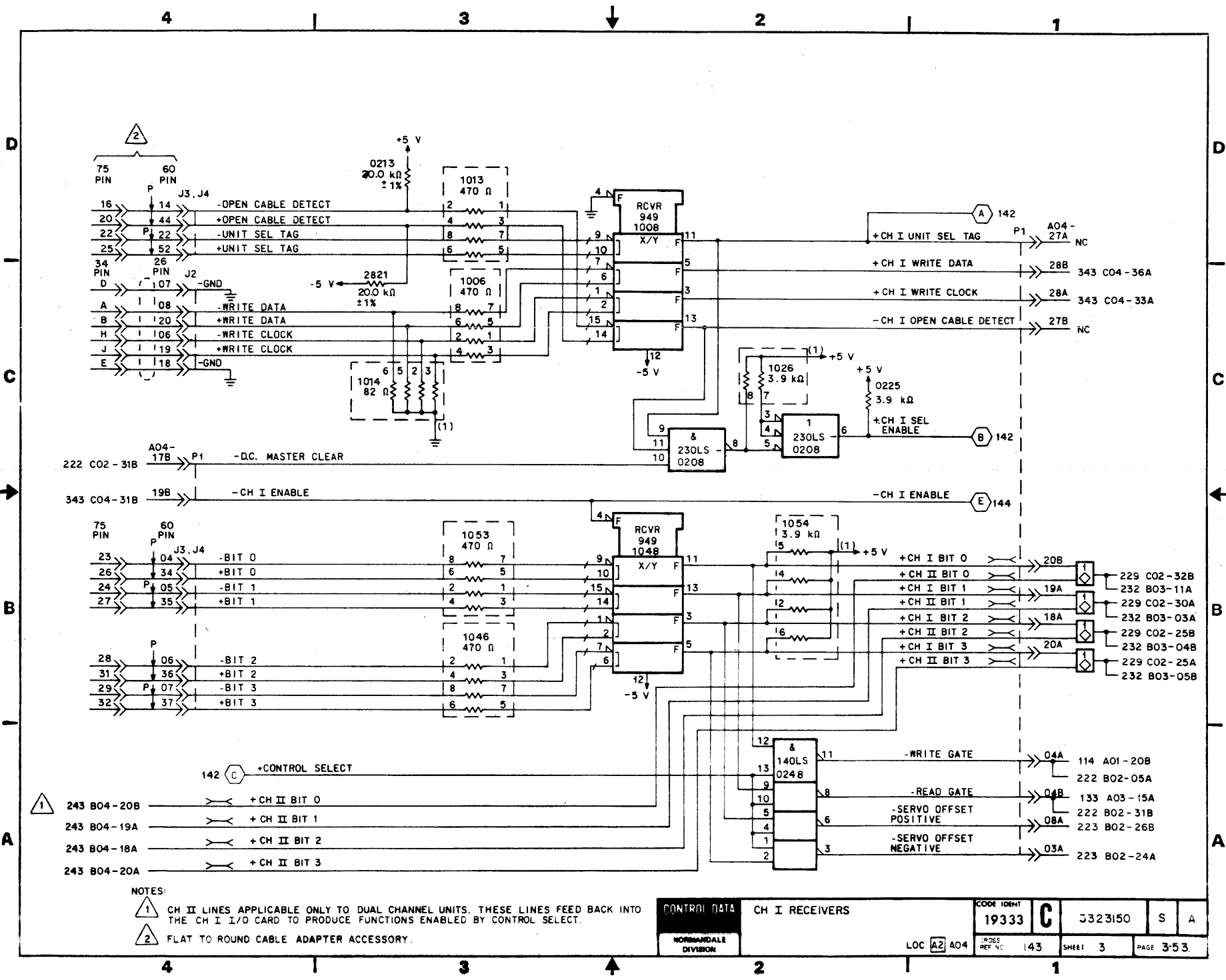
DRAWN	<i>M. Anderson</i>	2/8/80	CONTROL DATA	CHANNEL I I/O DIAGRAMS	CODE IDENT	19333	C	83323150	U	D
CHECKED					CROSS REF NO	141	SHEET	1 of 6	PAGE	3-51
ENGINEER			NORMANDEALE DIVISION	TYPE: DFAX	LOC:	A2	A04			
APPROVED										



NOTES: 143 (A) +CH I UNIT SELECT TAG

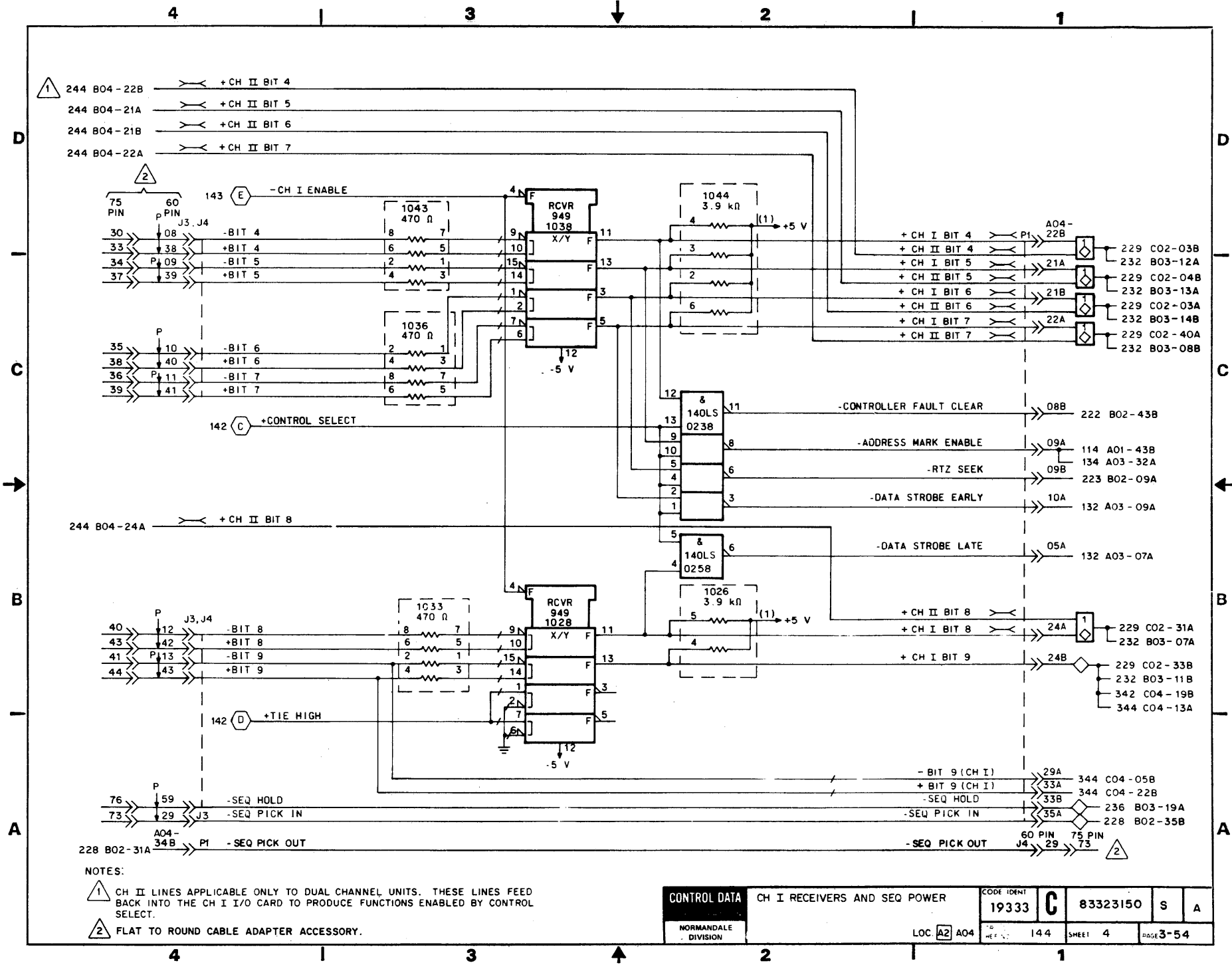
- 1 CH II LINE APPLICABLE ONLY TO DUAL CHANNEL UNITS. THIS LINE FEEDS BACK INTO THE CH I I/O CARD TO PRODUCE CONTROL SELECT.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA NORMANDEALE DIVISION	CH I RECEIVERS AND UNIT SELECT	CODE IDENT 19333	C	83323150	U	D
	LOC: A2 A04	CROSS REF NO 142	SHEET 2	PAGE 3-52		



NOTES:
 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA		CH I RECEIVERS		CODE IDENT	C	J323150	S	A
NORMANDEALE DIVISION		LOC A2 A04		19333				

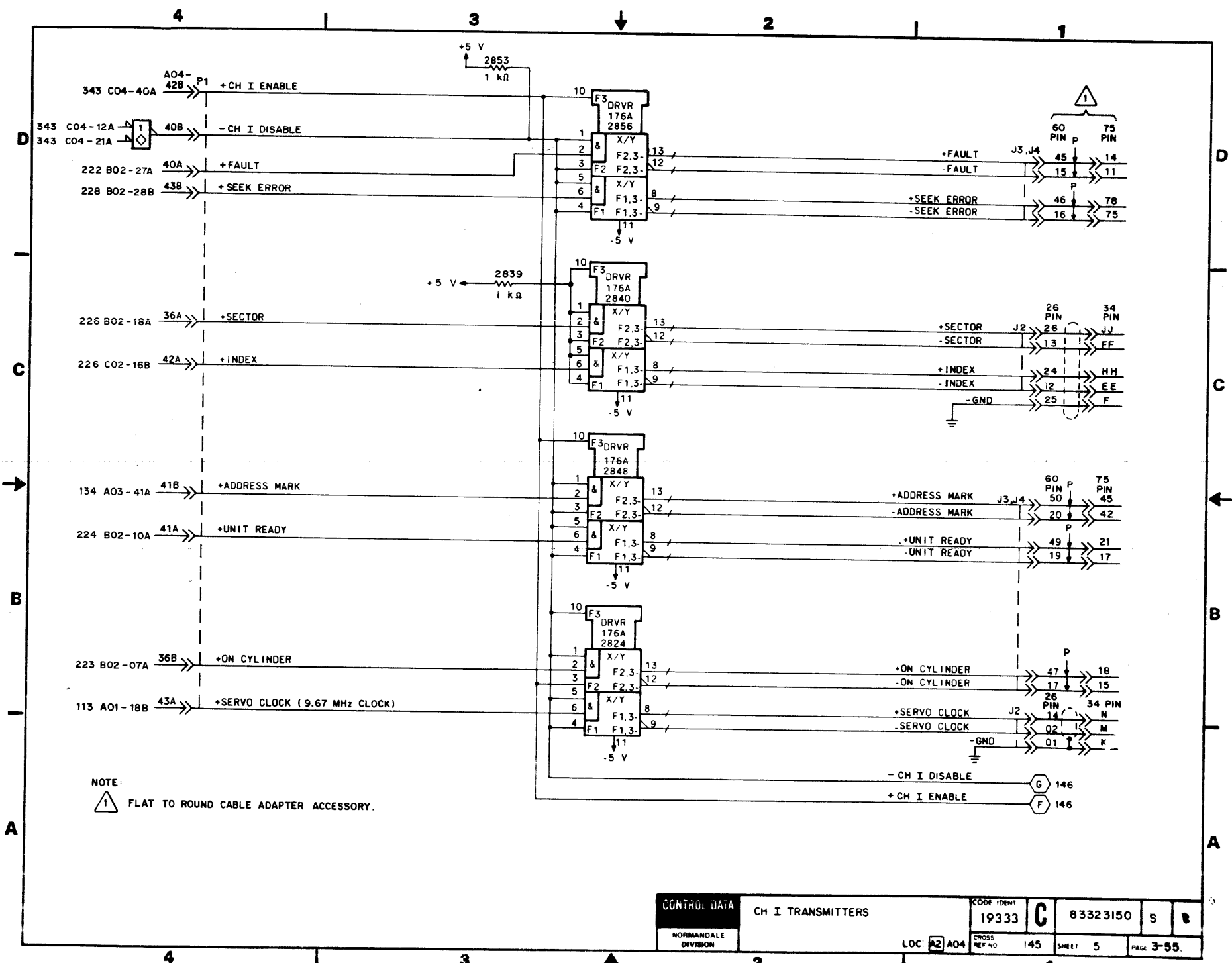


NOTES:

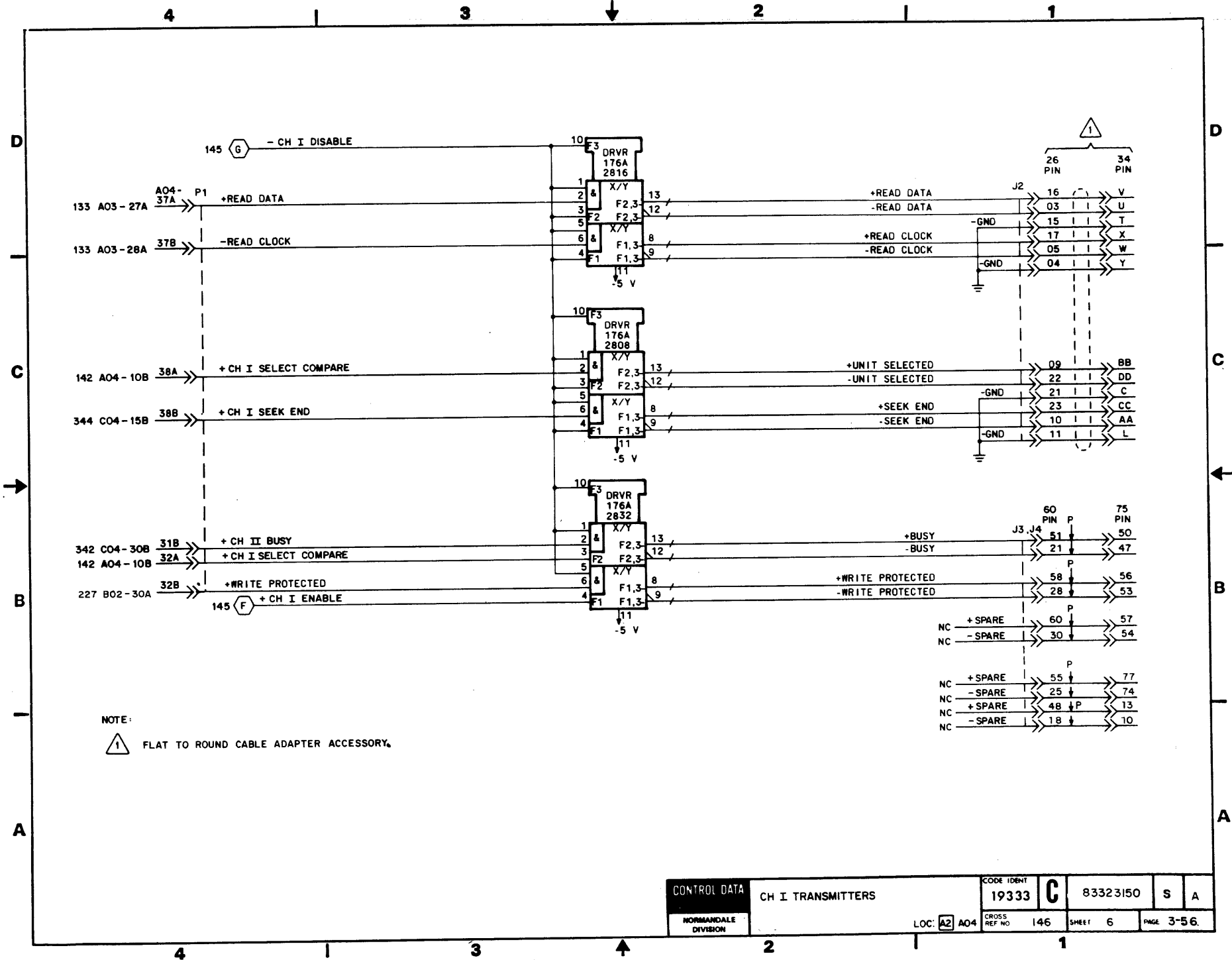
1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.

2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA	CH I RECEIVERS AND SEQ POWER		CODE IDENT	C	83323150	S	A
	NORMANDALE DIVISION	LOC. A2 A04	19333				



NOTE:
 FLAT TO ROUND CABLE ADAPTER ACCESSORY.



NOTE:
 1 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA	CH I TRANSMITTERS	CODE IDENT	C	83323150	S	A	
		19333					
NORMANDEALE DIVISION	LOC: A2 A04	CROSS REF NO	146	SHEET	6	PAGE	3-56

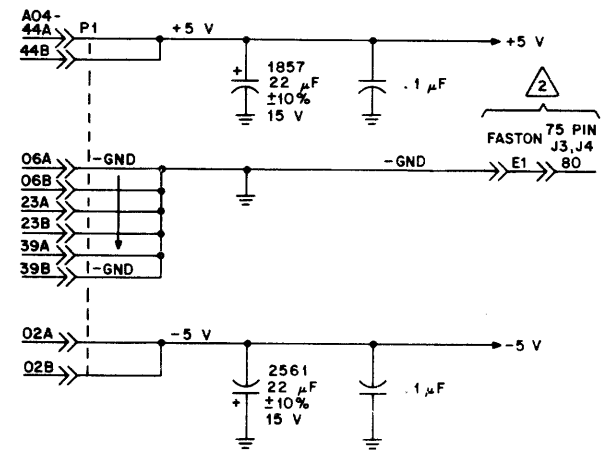
REVISION STATUS OF SHEETS																			
I	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A	A														
B	A	A	A	B	A														
C	C	A	A	B	A														

REVISIONS				
REV.	ECO	DESCRIPTION	DRFT.	DATE
A	PE23000	RELEASED		
B	PE62248	CORRECTIONS		3-18-81
C	DJO2075	CHANGE IC	MJ	2-31-81

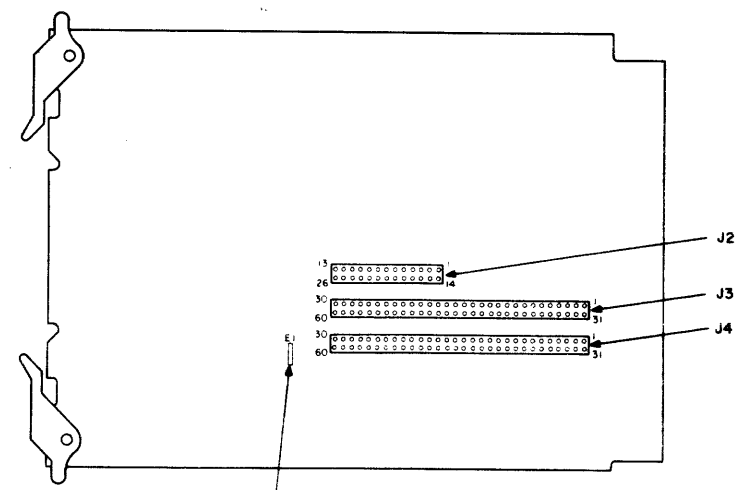
UNUSED RESISTOR PACKS	
LOCATION	PINS
0264	4,7
1014	4,7,8
1026	6
1044	5,7,8
1054	3,7,8

UNUSED LOGIC ELEMENTS		
ELEMENT	LOCATION	OUTPUT PIN(S)
175LS	0228	5,6

- NOTES:
- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
 - 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

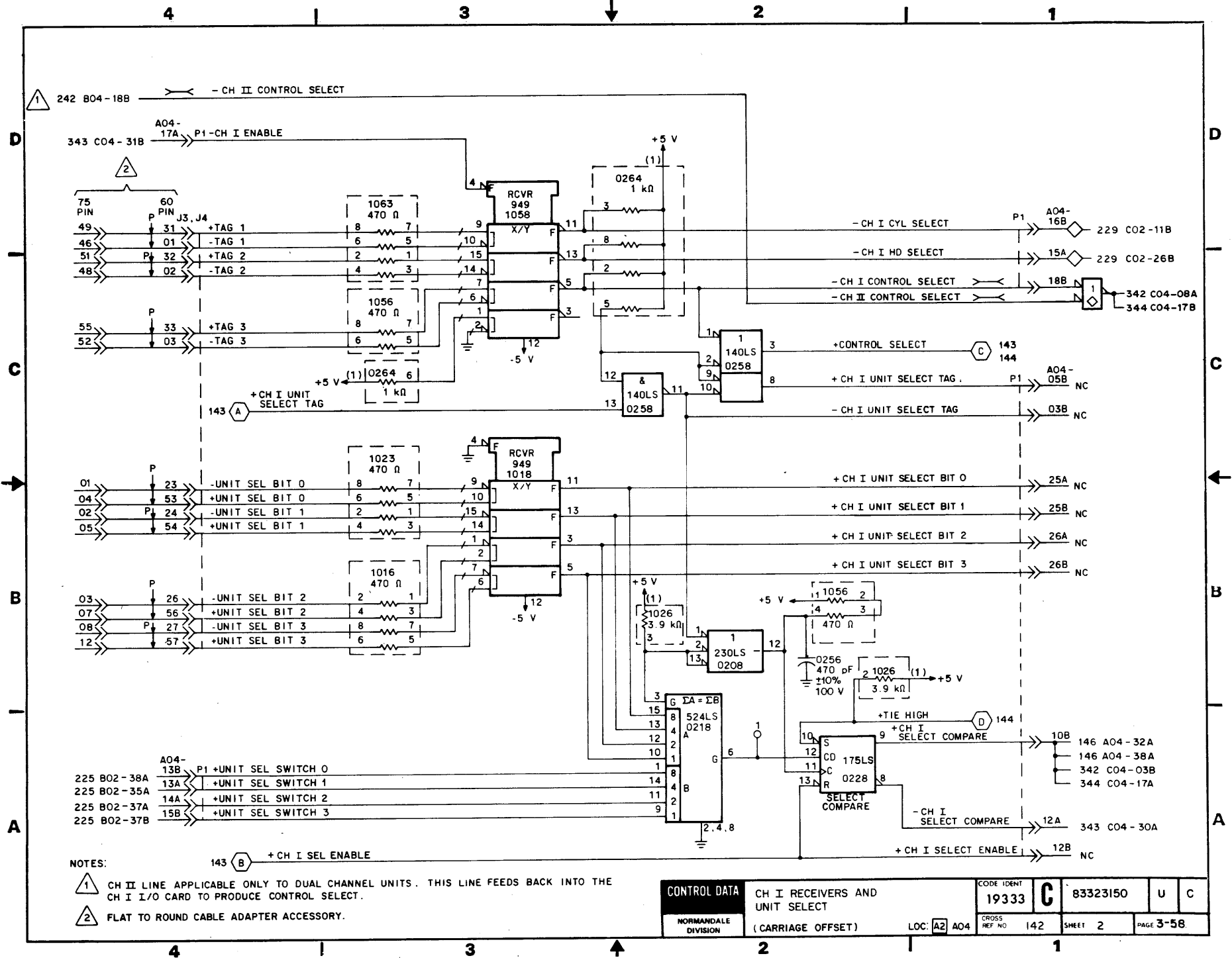


.1 µF FILTER CAPS	
+5 V	-5 V
0214	1012
0226	1122
0235	1032
0245	1042
0255	1147
1015	1262
1025	2812
1035	2822
1145	2830
1155	2837
2814	2845
2823	2855
2831	
2838	
2846	
2854	



GND FOR TERMINATOR
**APPLICABLE ONLY TO UNITS WITH CARRIAGE
 OFFSET CAPABILITY.**

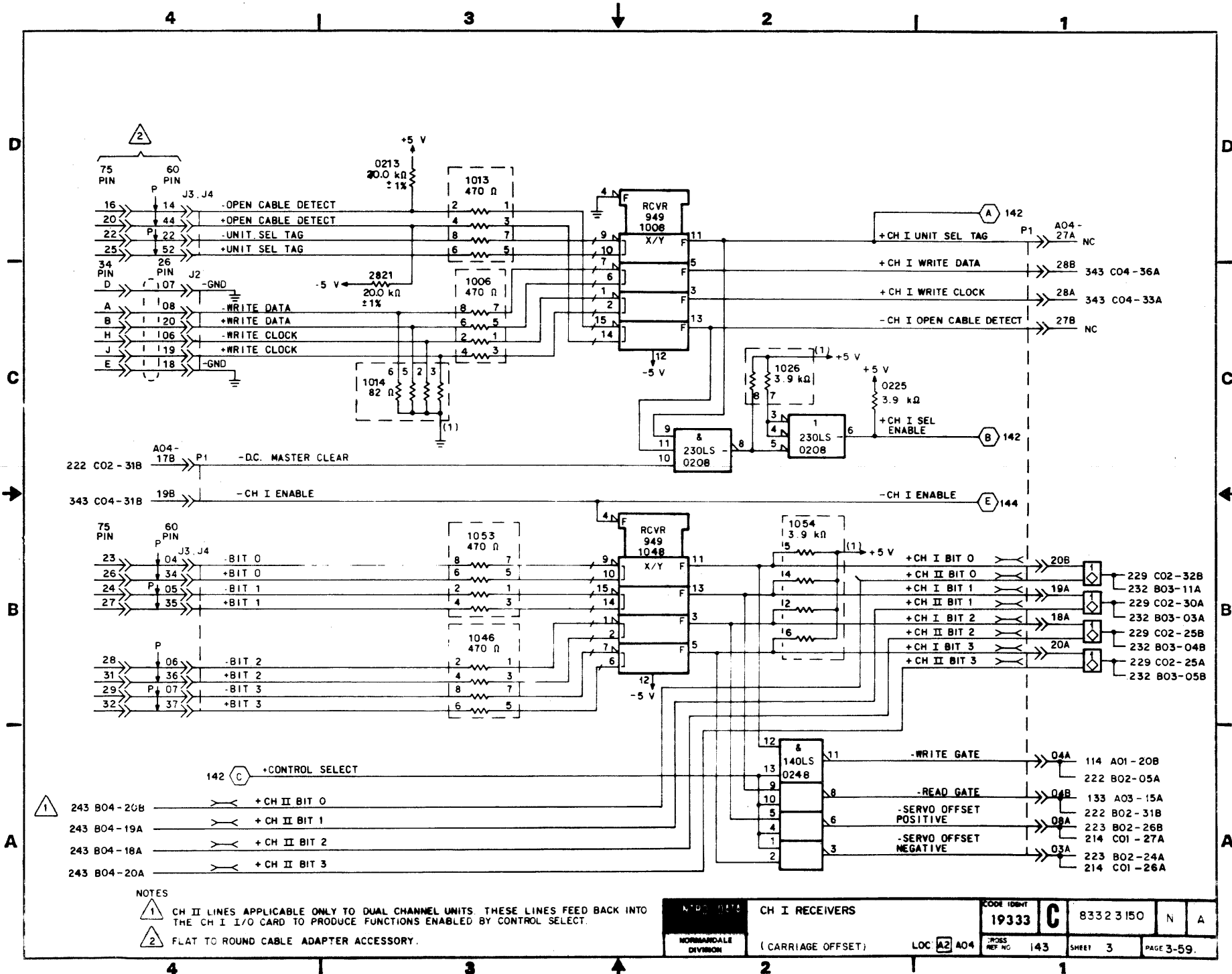
DRAWN <i>T. Long</i>	5/6/80	CONTROL DATA	CHANNEL I I/O DIAGRAMS	CODE IDENT 19333	C	83323150	U	C
CHECKED				CROSS REF NO	141	SHEET 1 of 6	PAGE 3-57	
ENGINEER		NORMANDEALE DIVISION	TYPE: DFAX	LOC: A2	A04			
APPROVED								



NOTES:

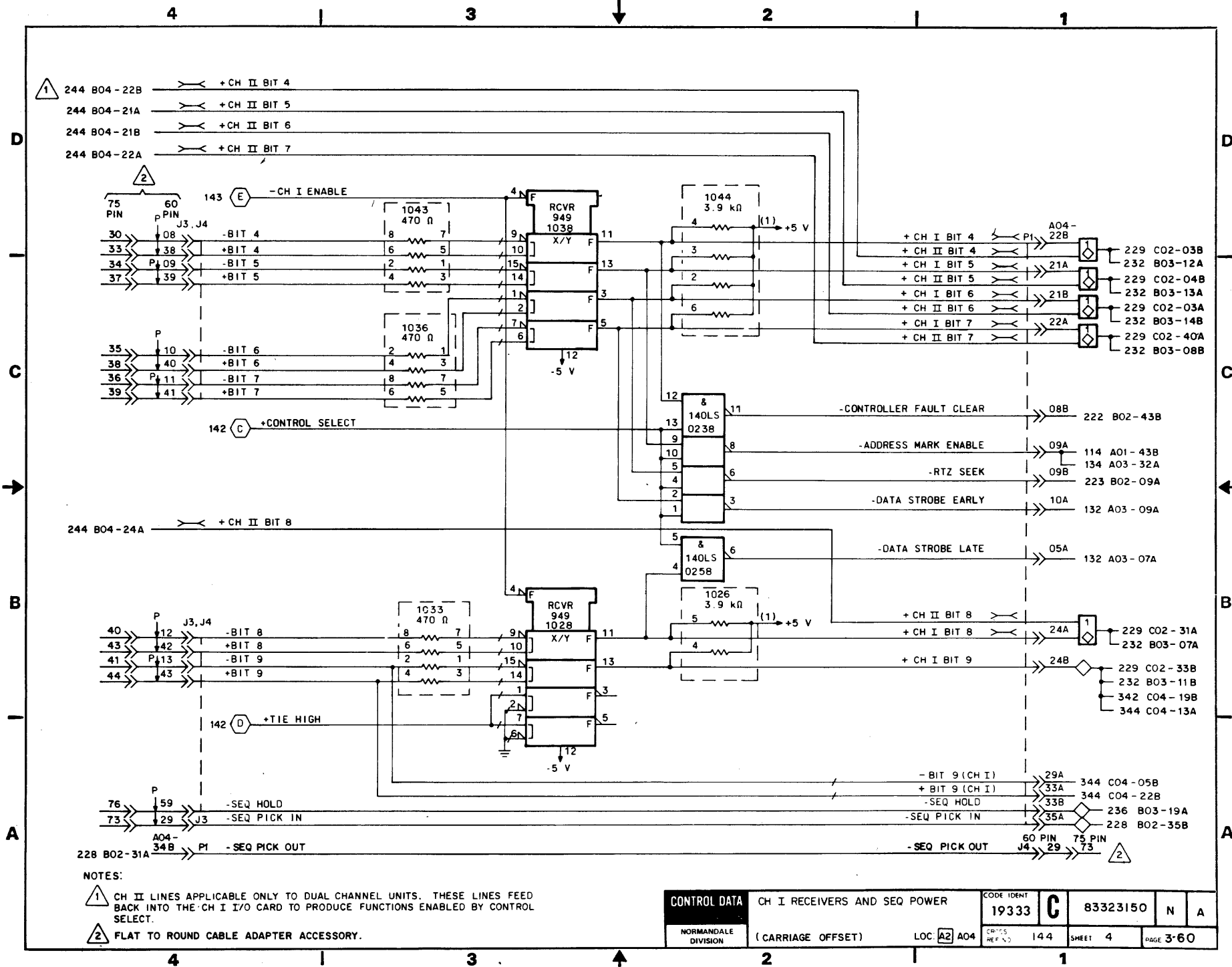
- ① CH II LINE APPLICABLE ONLY TO DUAL CHANNEL UNITS. THIS LINE FEEDS BACK INTO THE CH I I/O CARD TO PRODUCE CONTROL SELECT.
- ② FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA NORMANDEALE DIVISION	CH I RECEIVERS AND UNIT SELECT (CARRIAGE OFFSET)	CODE IDENT	U	C
		19333 C	83323150	
LOC: A2 A04	CROSS REF NO: 142	SHEET 2	PAGE 3-58	



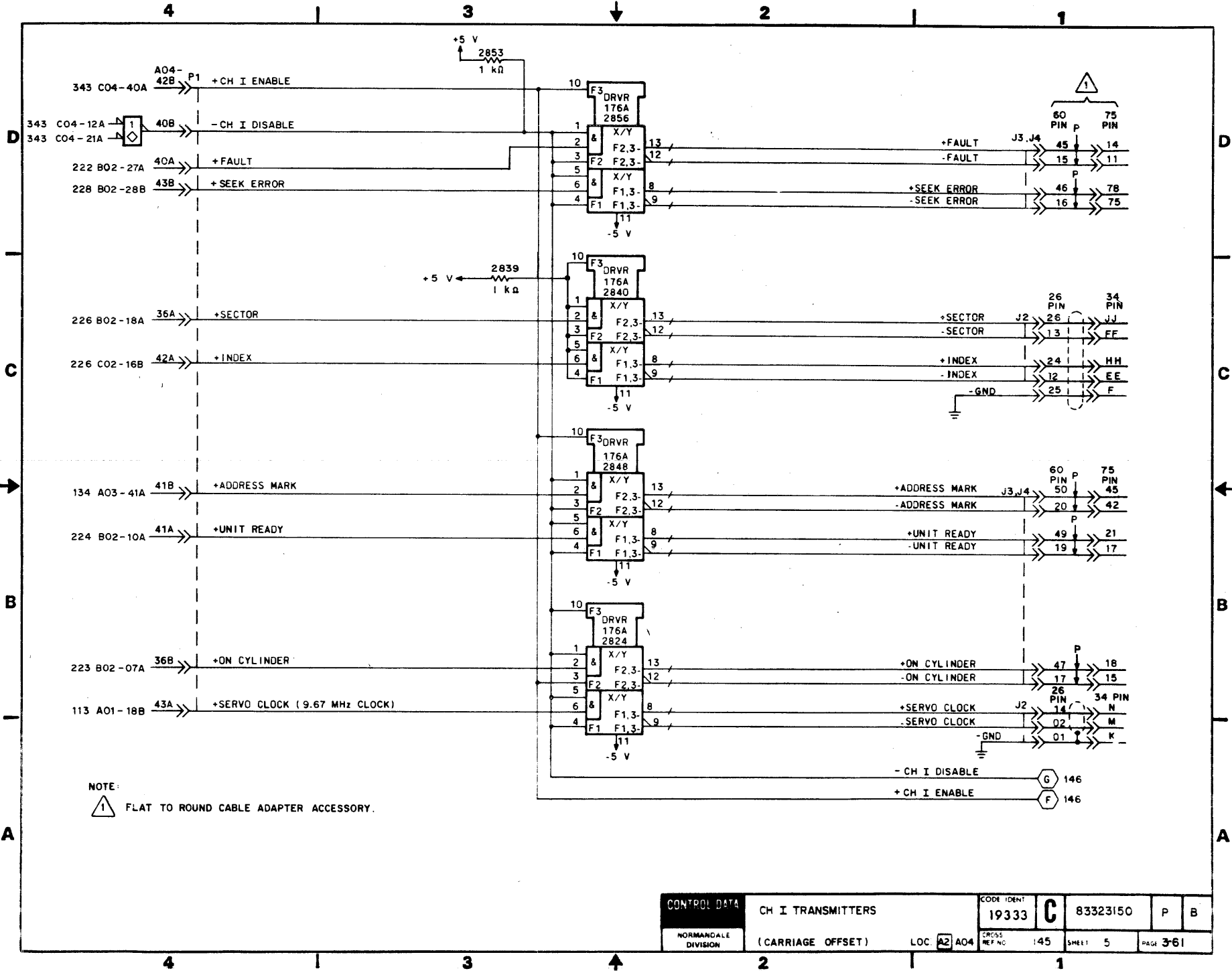
NOTES
 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

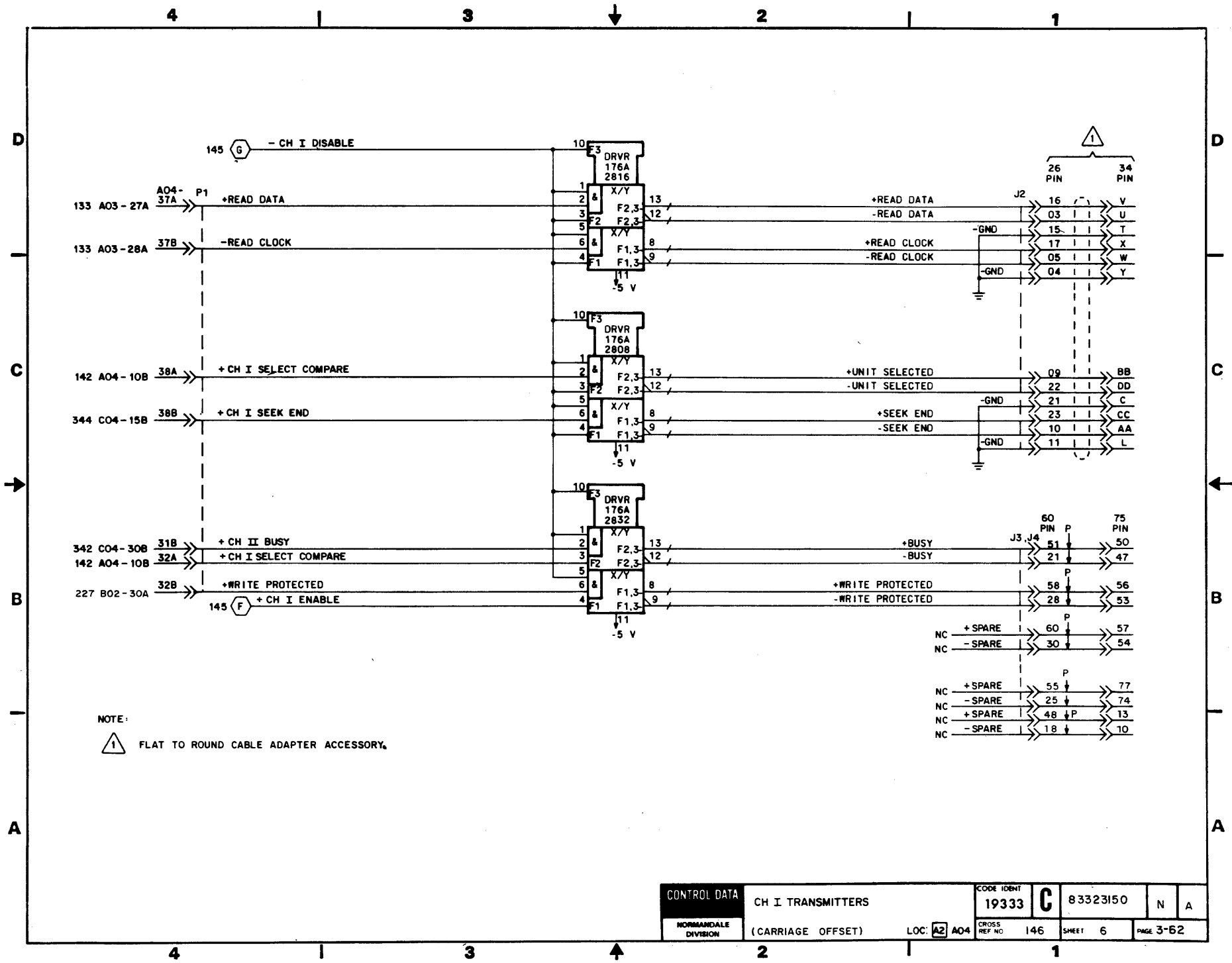
NORMANDALE DIVISION	CH I RECEIVERS (CARRIAGE OFFSET)	CODE IDENT 19333	C	83323150	N	A
	LOC A2 A04	DRAWING REF NO 143				



NOTES:
 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA		CH I RECEIVERS AND SEQ POWER		CODE IDENT	83323150		N	A
NORMANDEALE DIVISION		(CARRIAGE OFFSET)		19333	C		SHEET 4	PAGE 3-60
LOC: A2 A04		CR755 REF NO: 144		SHEET 4		PAGE 3-60		





CONTROL DATA	CH I TRANSMITTERS (CARRIAGE OFFSET)	CODE IDENT	C	83323150	N	A
		19333				
NORMANDEALE DIVISION	LOC: A2 A04	CROSS REF NO	146	SHEET	6	PAGE 3-62

REVISION STATUS OF SHEETS																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A	A														
B	B	A	A	A	A														
C	B	A	A	C	A														

REVISIONS					
REV	ECO	DESCRIPTION	DWFT	DATE	CHK'D
A	PE23000	RELEASED		12/28/81	
B	DJ02075	CHANGE IC	MJ	12/31/81	
C	DJ02158	CORRECTION	MJ	12-31-81	

UNUSED RESISTOR PACKS

LOCATION	PINS
0264	4,7
1014	4,7,8
1026	6
1044	5,7,8
1054	3,7,8

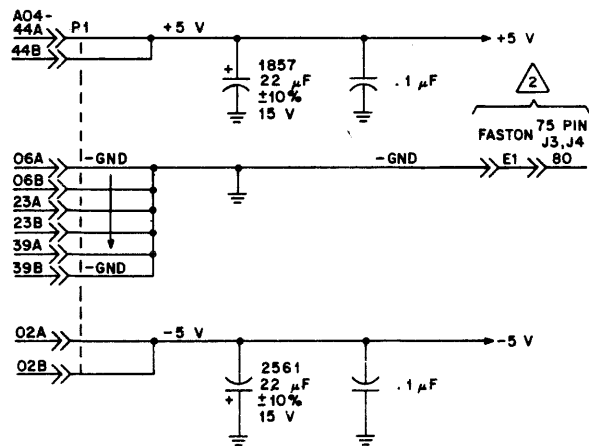
UNUSED LOGIC ELEMENTS

ELEMENT	LOCATION	OUTPUT PIN(S)
175LS	0228	5,6



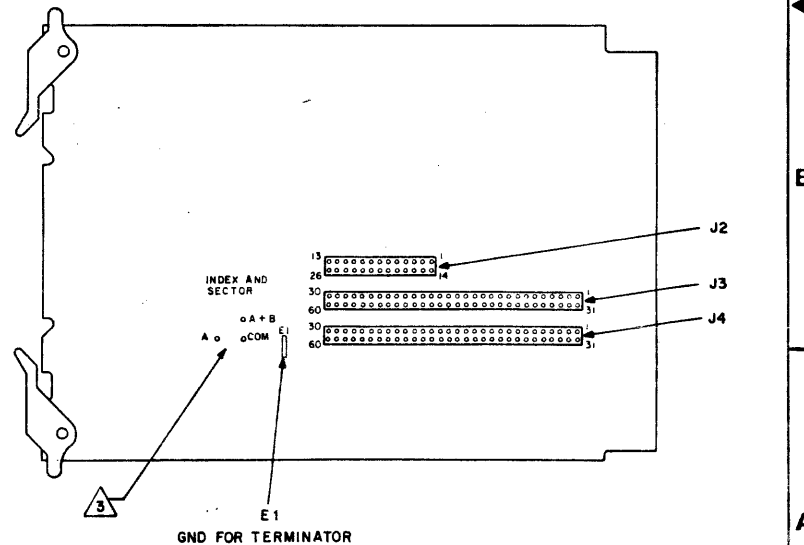
NOTES:

- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.
- 3 INDEX/SECTOR CABLE DETERMINATION JUMPER

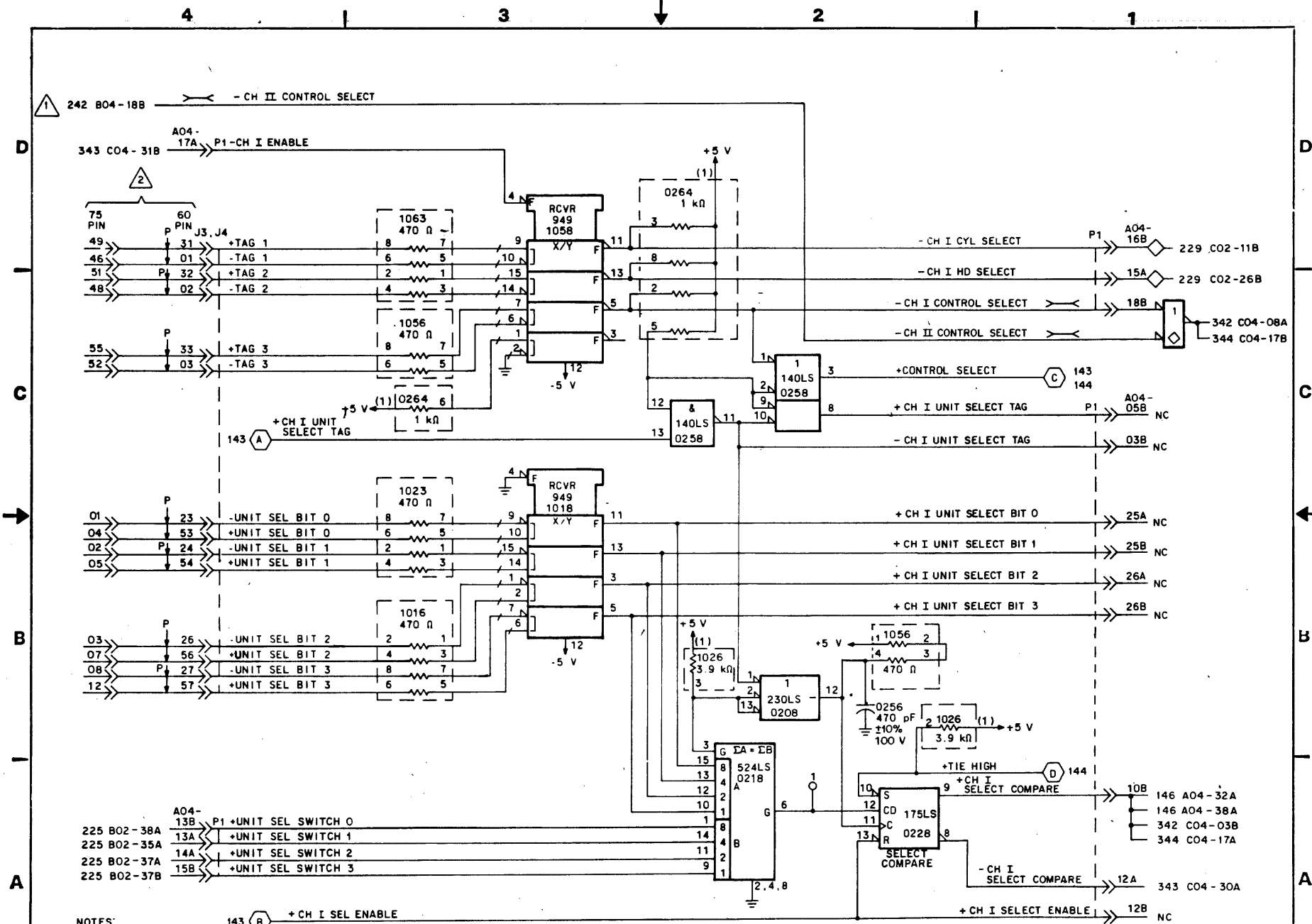


.1 µF FILTER CAPS

+5 V	-5 V
0214	1012
0226	1122
0235	1032
0245	1042
0255	1147
1015	1262
1025	2812
1035	2822
1145	2830
1155	2837
2814	2845
2823	2855
2831	
2838	
2846	
2854	



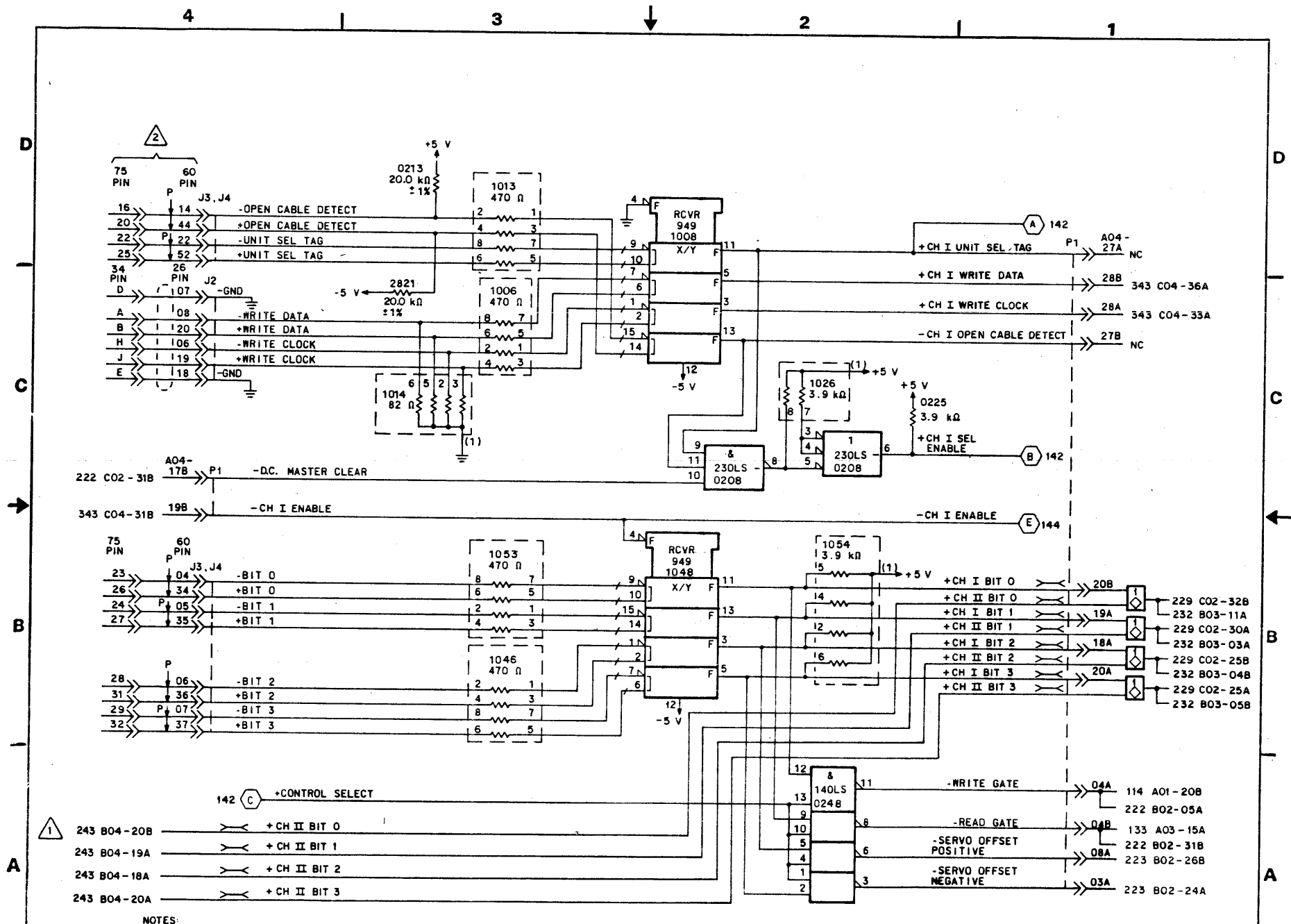
DRAWN	<i>Thompson</i>	CONTROL DATA	CHANNEL I I/O DIAGRAMS	CODE IDENT	19333	C	83323150	U	C
CHECKED				CROSS REF	141	SHEET	26	PAGE	3-62.1
ENGINEER	<i>E.K. Johnson</i>	NORRMANDALE DIVISION	TYPE MFAx	LOC	A2	A04			
APPROVED									



NOTES: 143 (B) + CH I SEL ENABLE

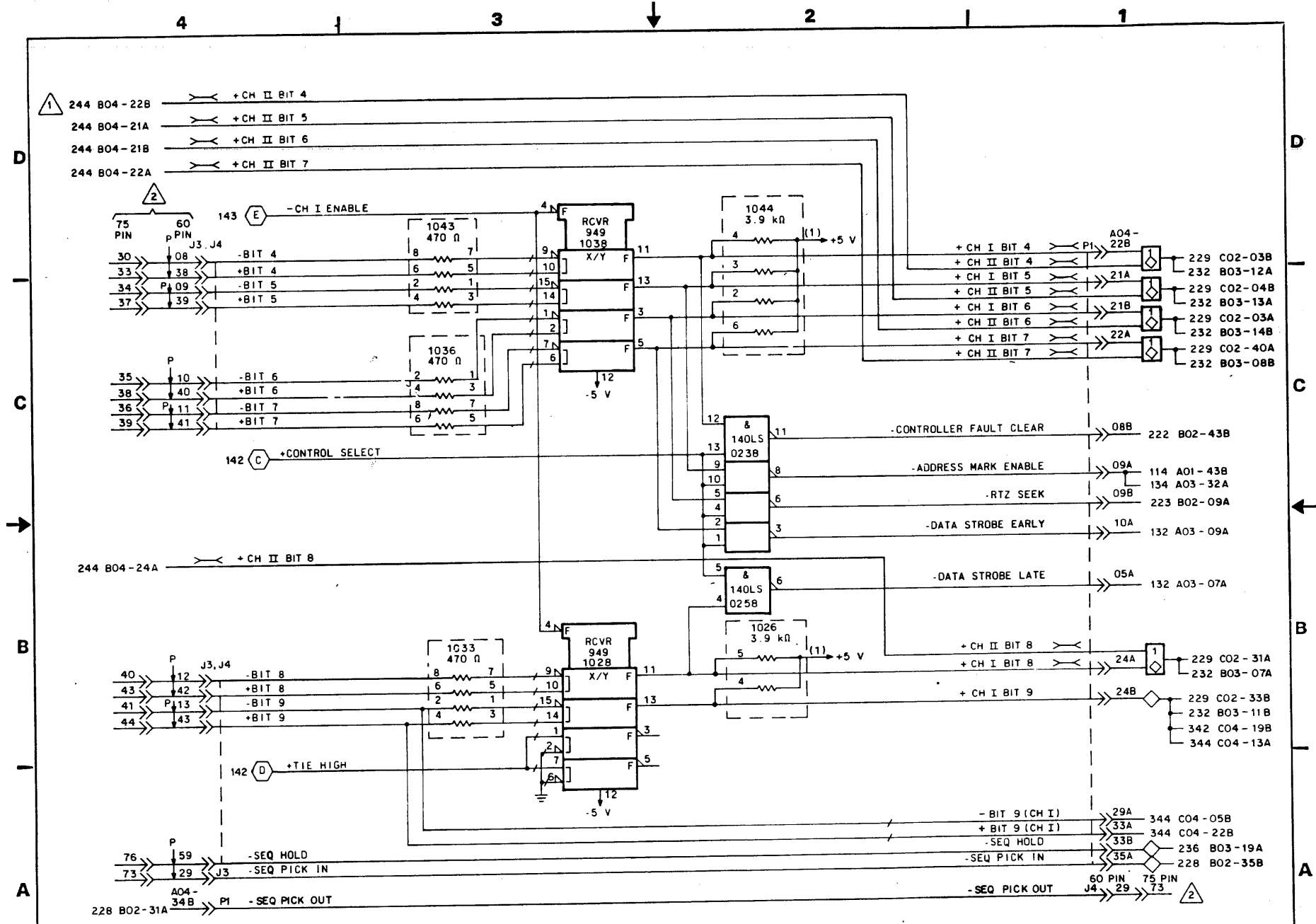
- 1 CH II LINE APPLICABLE ONLY TO DUAL CHANNEL UNITS. THIS LINE FEEDS BACK INTO THE CH I I/O CARD TO PRODUCE CONTROL SELECT.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA	CH I RECEIVERS AND UNIT SELECT		CODE IDENT	19333	C	83323150	U	B
	NORMANDALE DIVISION	LOC: A2 A04	CROSS REF NO	142	SHEET	2	PAGE 3-62.2	



NOTES:

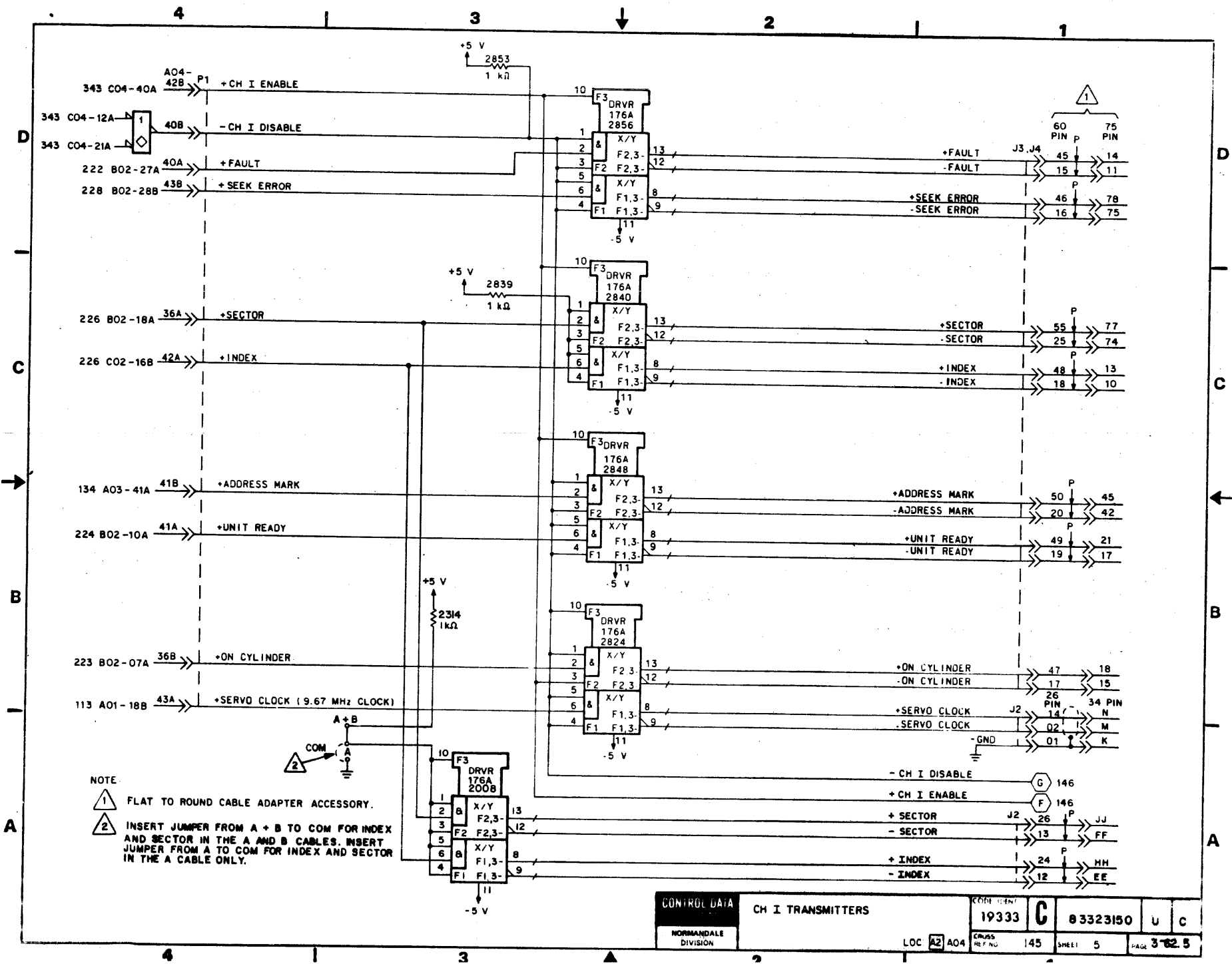
- 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.



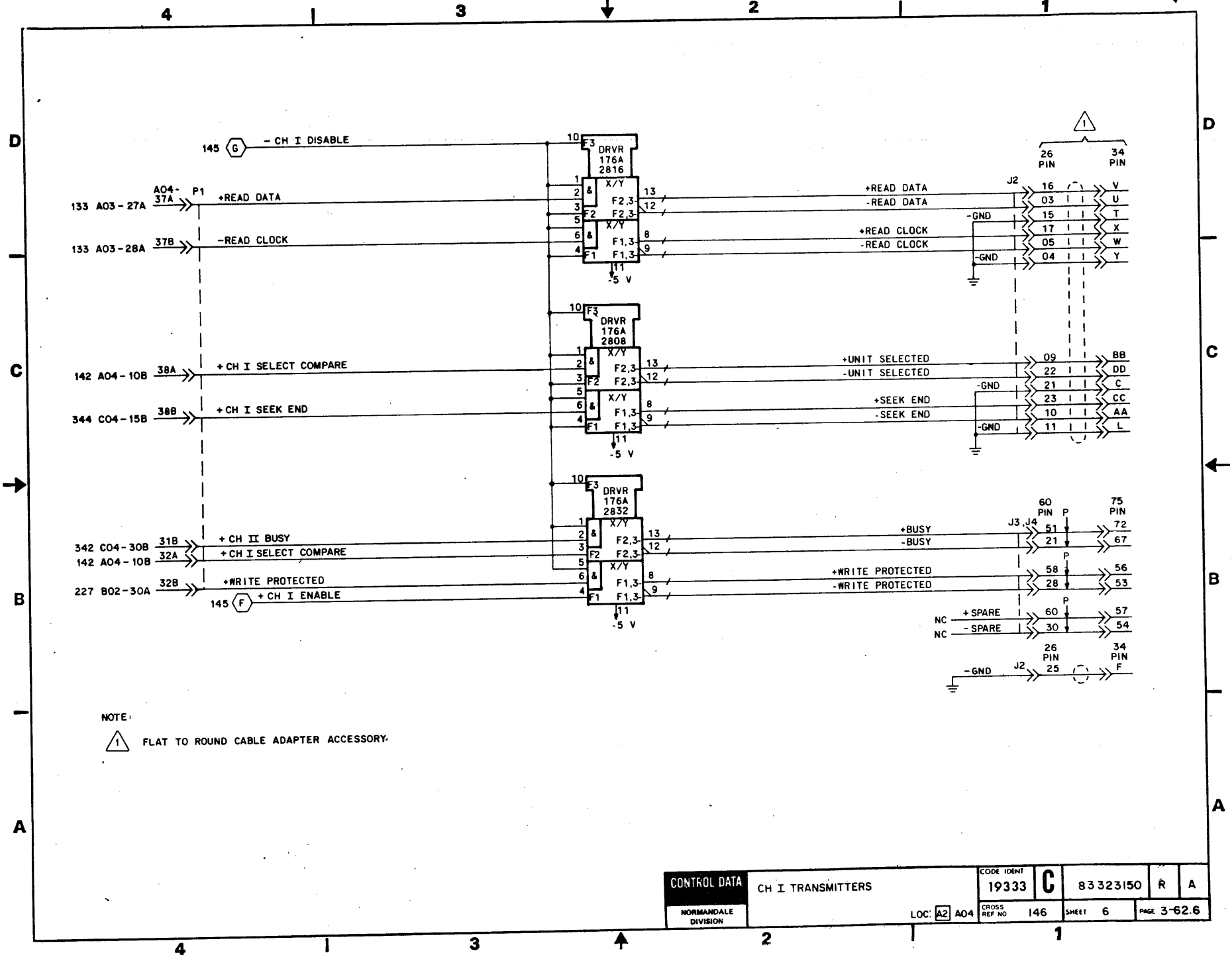
NOTES:

- ① CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.
- ② FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA	CH I RECEIVERS AND SEQ POWER		CODE IDENT	C	83323150	R	A
	NORMANDEALE DIVISION	LOC: A2 A04	CRYS REF NO: 144				



NOTE:
 1 FLAT TO ROUND CABLE ADAPTER ACCESSORY.
 2 INSERT JUMPER FROM A + B TO COM FOR INDEX AND SECTOR IN THE A AND B CABLES. INSERT JUMPER FROM A TO COM FOR INDEX AND SECTOR IN THE A CABLE ONLY.



CONTROL DATA	CH I TRANSMITTERS	CODE IDENT	19333	C	83323150	R	A
		NORMANDEALE DIVISION	CROSS REF NO	146	SHEET	6	PAGE

LOC: A2 A04

REVISION STATUS OF SHEETS																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A	A														
B	B	B	A	A	B														
C	B	C	A	A	B														

UNUSED RESISTOR PACKS

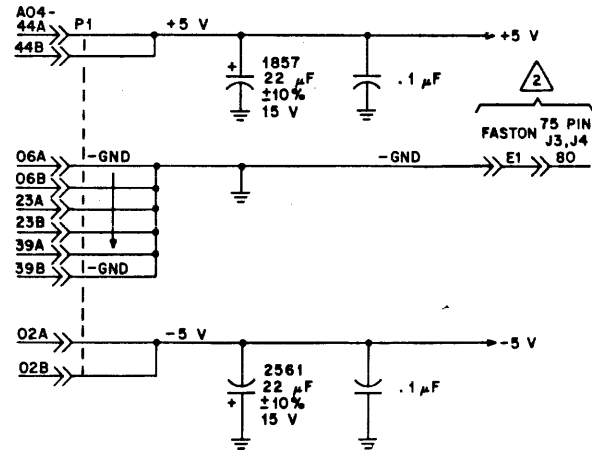
LOCATION	PINS
0264	4,7
1014	4,7,8
1044	5,7,8
1054	3,7,8

UNUSED LOGIC ELEMENTS

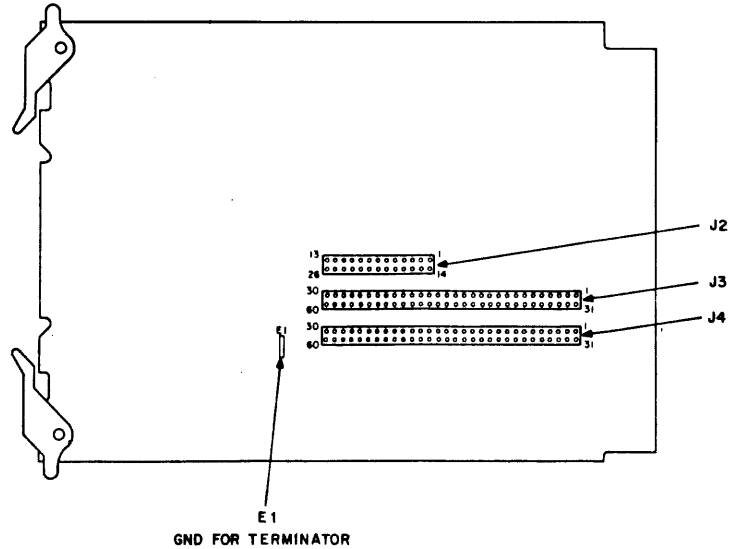
ELEMENT	LOCATION	OUTPUT PINS(S)
175LS	0228	5,6

REVISIONS					
REV.	ECO.	DESCRIPTION	DRFT	DATE	CHK'D
A	DJ23000	RELEASED		M.J.	1/27/82
B	DJ02353	CHG FAX CARD		FA	8/15/82
C	DJ02492	CHG AFFAX BD BLANK		MJ	7-18-83

NOTES:
 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

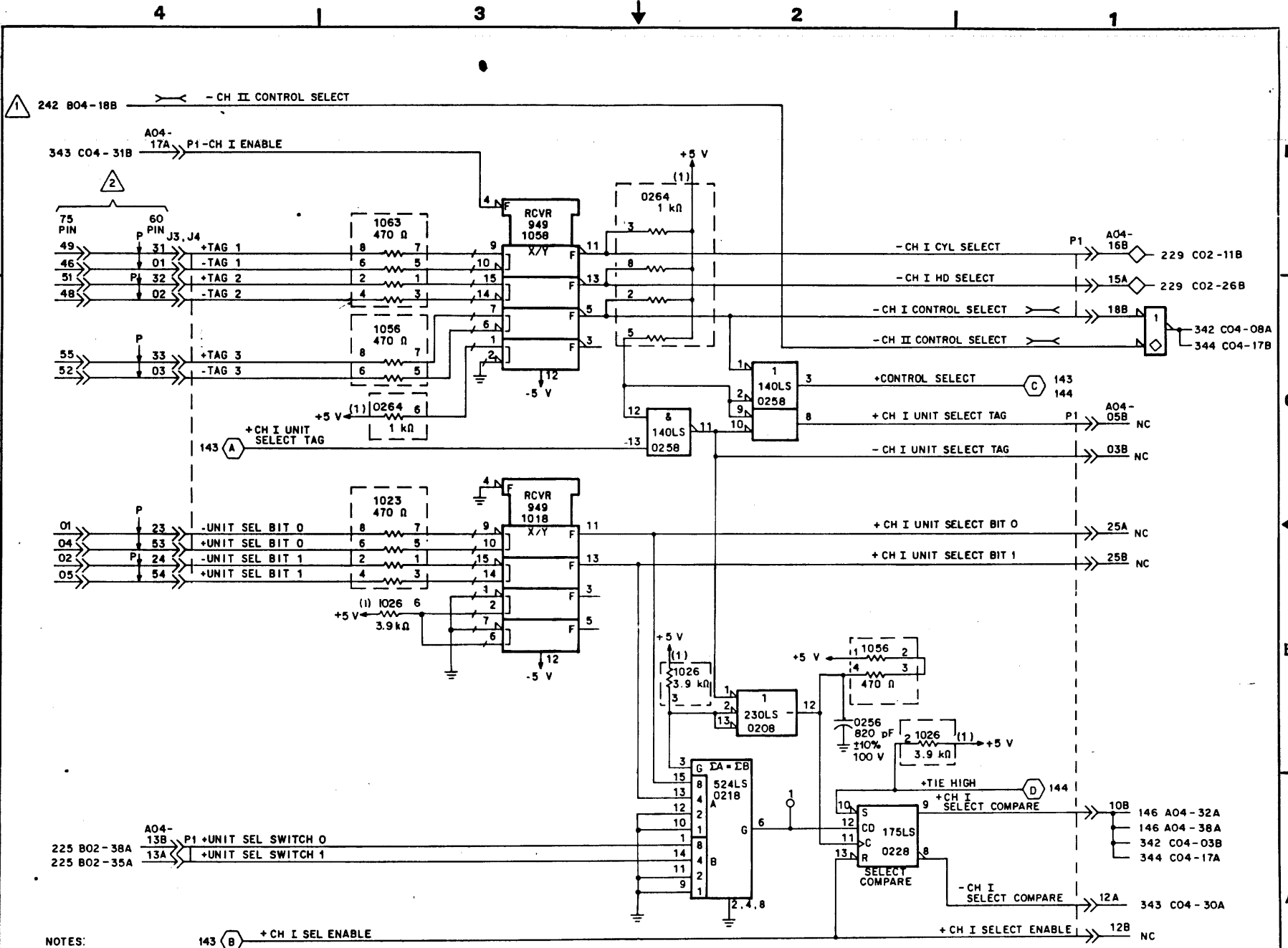


.1 µF FILTER CAPS	
+5 V	-5 V
0214	1012
0226	1122
0235	1032
0245	1042
0255	1147
1015	1262
1025	2812
1035	2822
1145	2830
1155	2837
2814	2845
2823	2855
2831	
2838	
2846	
2854	



APPLICABLE ONLY TO BZ9A7E/F UNITS WITH INDEX AND SECTOR IN THE "A" CABLE

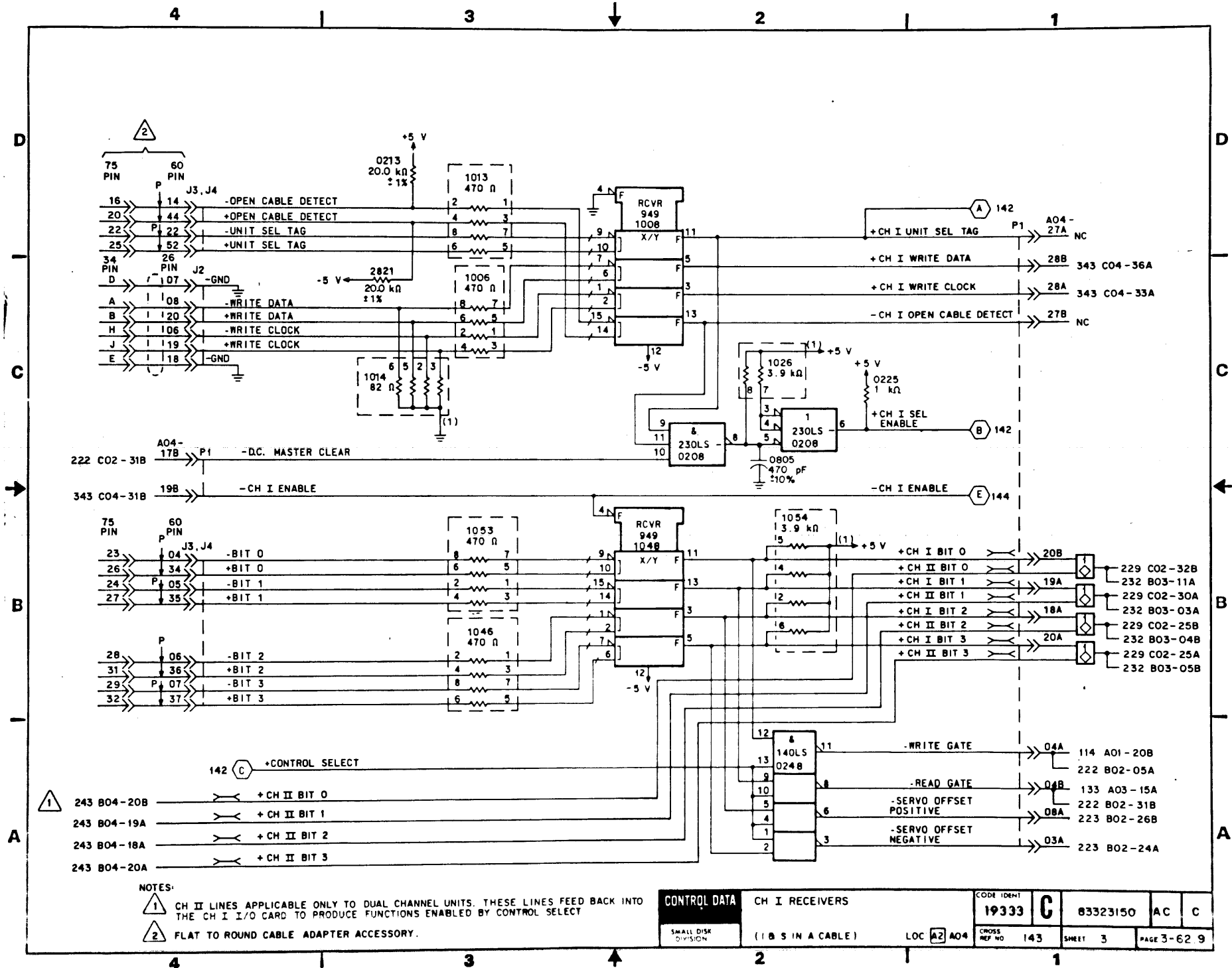
DRAWN	M. JAHN	4-12-82	CONTROL DATA	CODE IDENT	19333	C	83323150	AC	C
CHECKED	D.P.	4-13-82		CHANNEL I-I/O DIAGRAMS	CROSS REF NO		141	SHEET	1 OF 6
ENGINEER	H.M.M.	4-13-82	SMALL DISK DIVISION	TYPE	AFFAX	LOC	A2 A04		
APPROVED									



NOTES: 143 (A) +CH I SEL ENABLE

- 1 CH II LINE APPLICABLE ONLY TO DUAL CHANNEL UNITS. THIS LINE FEEDS BACK INTO THE CH I I/O CARD TO PRODUCE CONTROL SELECT.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

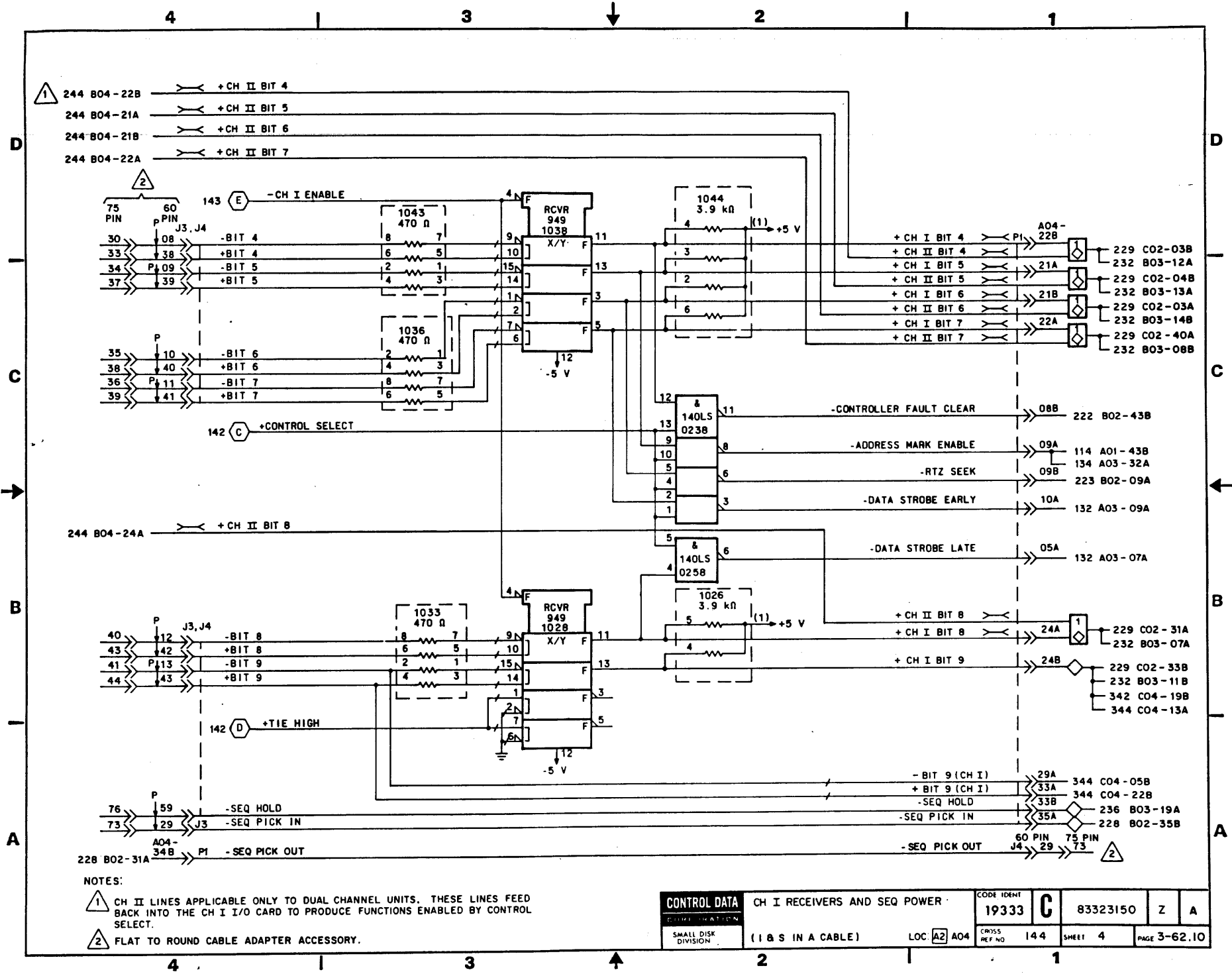
CONTROL DATA		CH I RECEIVERS AND UNIT SELECT		CODE IDENT	C	83323150	Z	B
SMALL DISK DIVISION		(1 B S IN A CABLE)		19333				
LOC: A2		AO4		CROSS REF NO	142	SHEET	2	PAGE
						3-62.8		



NOTES:

- ① CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT
- ② FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA		CH I RECEIVERS		CODE IDENT	C	83323150	AC	C	
SMALL DISK DIVISION	(1 B S IN A CABLE)	LOC	A2	A04					CROSS REF NO
					PAGE 3-62 9				



NOTES:
 1 CH II LINES APPLICABLE ONLY TO DUAL CHANNEL UNITS. THESE LINES FEED BACK INTO THE CH I I/O CARD TO PRODUCE FUNCTIONS ENABLED BY CONTROL SELECT.
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

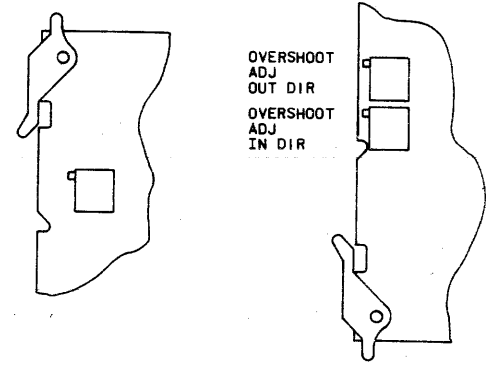
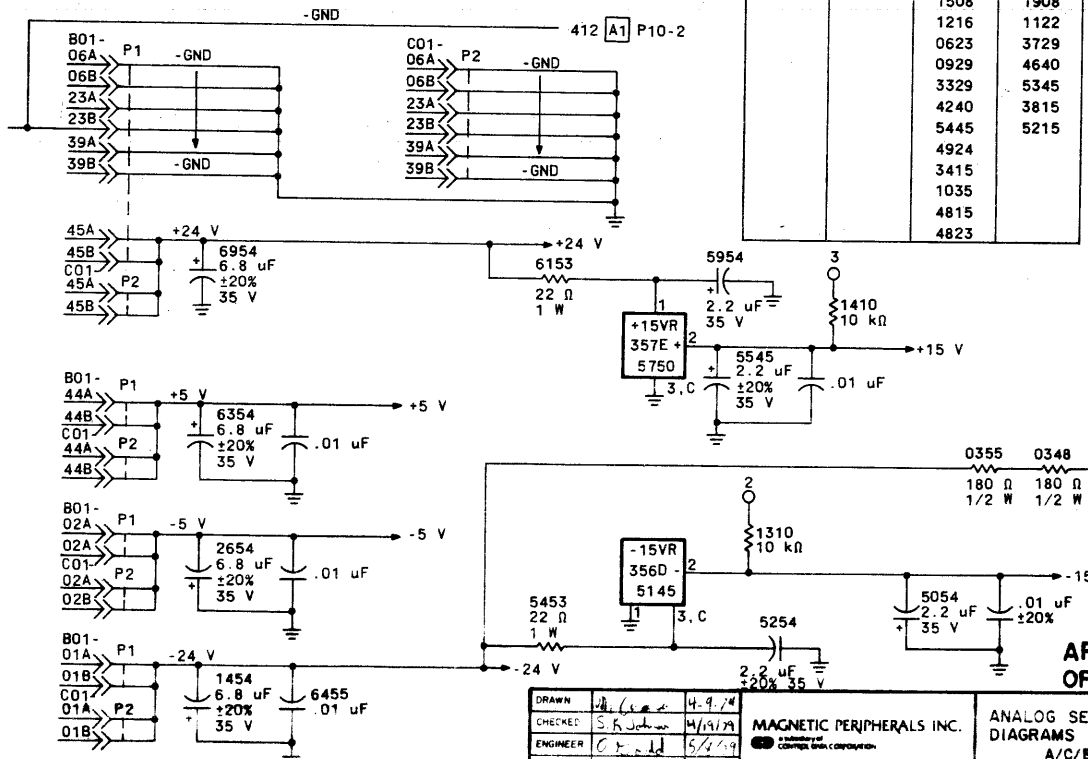
CONTROL DATA CORPORATION SMALL DISK DIVISION	CH I RECEIVERS AND SEQ POWER	CODE IDENT 19333	C	83323150	Z	A
	(1 & S IN A CABLE)	LOC: A2 A04				

REVISION STATUS OF SHEETS																			
I	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A	A	A													
B	A	A	A	A	A	B													
C	A	A	A	A	C	A													
D	A	A	A	D	D	A													
E	A	A	A	A	E	A													
F	A	A	A	A	F	A													
G	A	G	A	A	F	G													
H	A	G	A	A	H	G													
J	A	G	A	A	J	G													
K	A	G	A	A	K	G													
L	A	G	A	A	L	G													
M	A	G	A	A	M	G													
N	A	G	A	A	N	G													
P	A	G	A	A	P	G													

UNUSED LOGIC ELEMENTS		
ELEMENT	LOCATION	OUTPUT PIN(S)
195	6451	9, 10
324	4341	1
202LS	5831	8
148LS	6422	4, 10

.01 uF FILTER CAPS			
+5 V	-5 V	+15 V	-15 V
5640	4652	5608	6008
2708	2456	4808	5208
	1735	3408	3808
		1508	1908
		1216	1122
		0623	3729
		0929	4640
		3329	5345
		4240	3815
		5445	5215
		4924	
		3415	
		1035	
		4815	
		4823	

REVISIONS					
REV.	ECC.	DESCRIPTION	DRFT.	DATE	CHK'D
A	PE23000	RELEASED			
B	PE50636	IMPROVE OVERSHOOT			
C	PE49146	CORRECT LOGIC DIA	TH	7-25-79	
D	PE50705	CORRECTIONS	TH	2-26-79	
E	PE50593	BKX TO CKX	TH	2-26-79	
F	PE50630	ONE TRACK SEEK	TH	2-26-79	
G	PE50659	SERVO OVERSHOOT	TH	2-26-79	
H	PE50591A	NEW BOARD BLANK	CB	3-2-80	
J	PE50916A	CKX TO GKBX	MF	7-1-80	
K	PE62057	REMOVE CAPACITOR	CB	10-8-80	
L	PE62228	GKBX TO LKBX	MF	8-17-81	
M	DJ02159	CHANGE BOARD BLANK	MJ	1-6-82	
N	DJ03163	CHANGE BOARD BLANK	MJ	1-6-82	
P	DJ02218	CORRECTIONS	MJ	3-2-82	(DE-1)



- NOTES:
- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED EXCEPT *
 - 2 SEE CROSS REF NO 413 FOR CABLING INFORMATION.

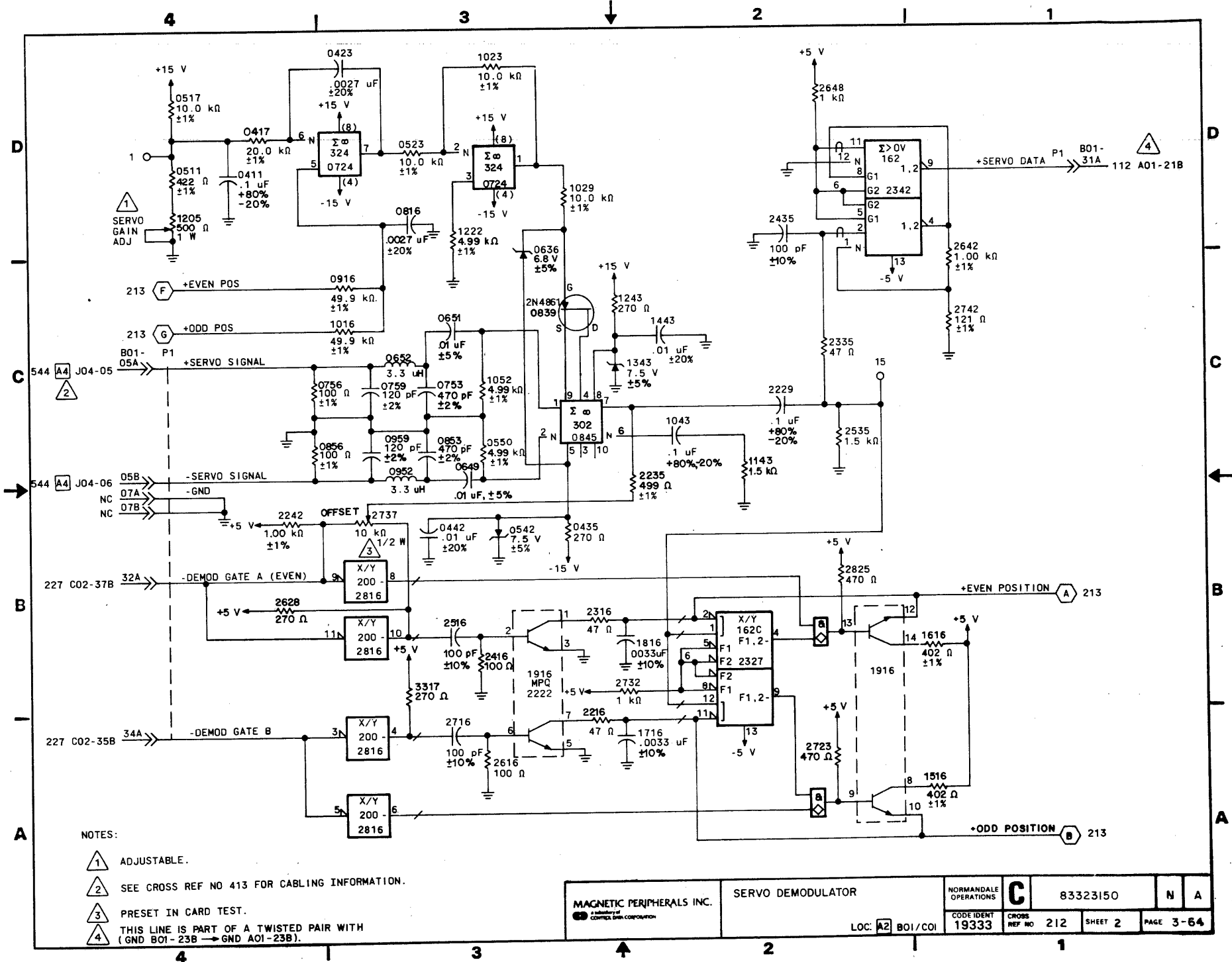
APPLICABLE ONLY TO UNITS WITHOUT CARRIAGE OFFSET CAPABILITY.

DRAWN	J. C. ...	4-9-74
CHECKED	S. R. ...	4/19/74
ENGINEER	C. ...	5/1/74
APPROVED		

MAGNETIC PERIPHERALS INC.
 A COMPASS DATA CORPORATION

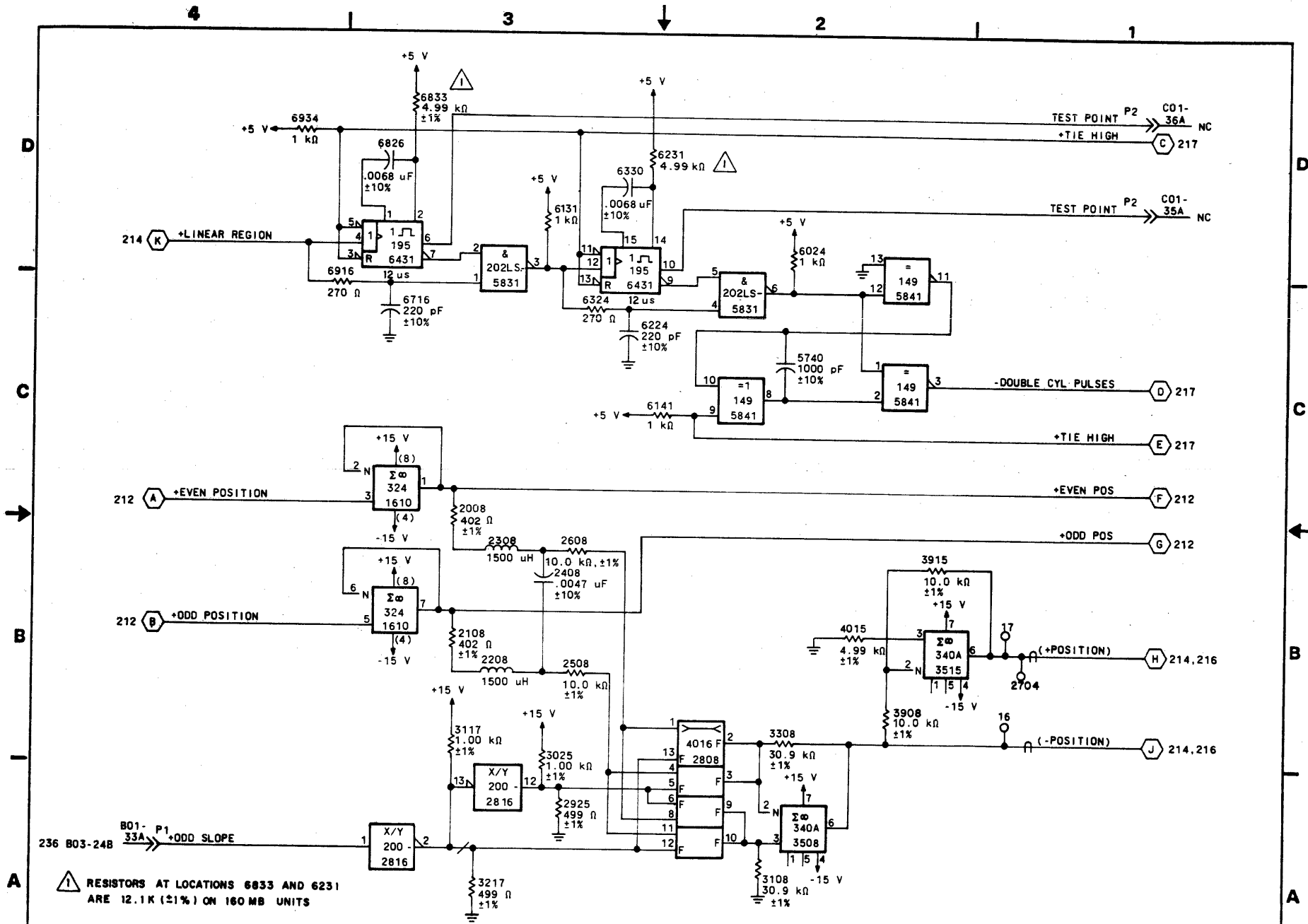
ANALOG SERVO DIAGRAMS
 TYPE: A/C/E/G/LKBX
 LOC: 2B B01/CO1

NORMANDALE OPERATIONS	C	83323150	V	P
CODE IDENT	19333	CROSS REF NO	211	SHEET 1 OF 7
		DATE	3-63	REF 75121807

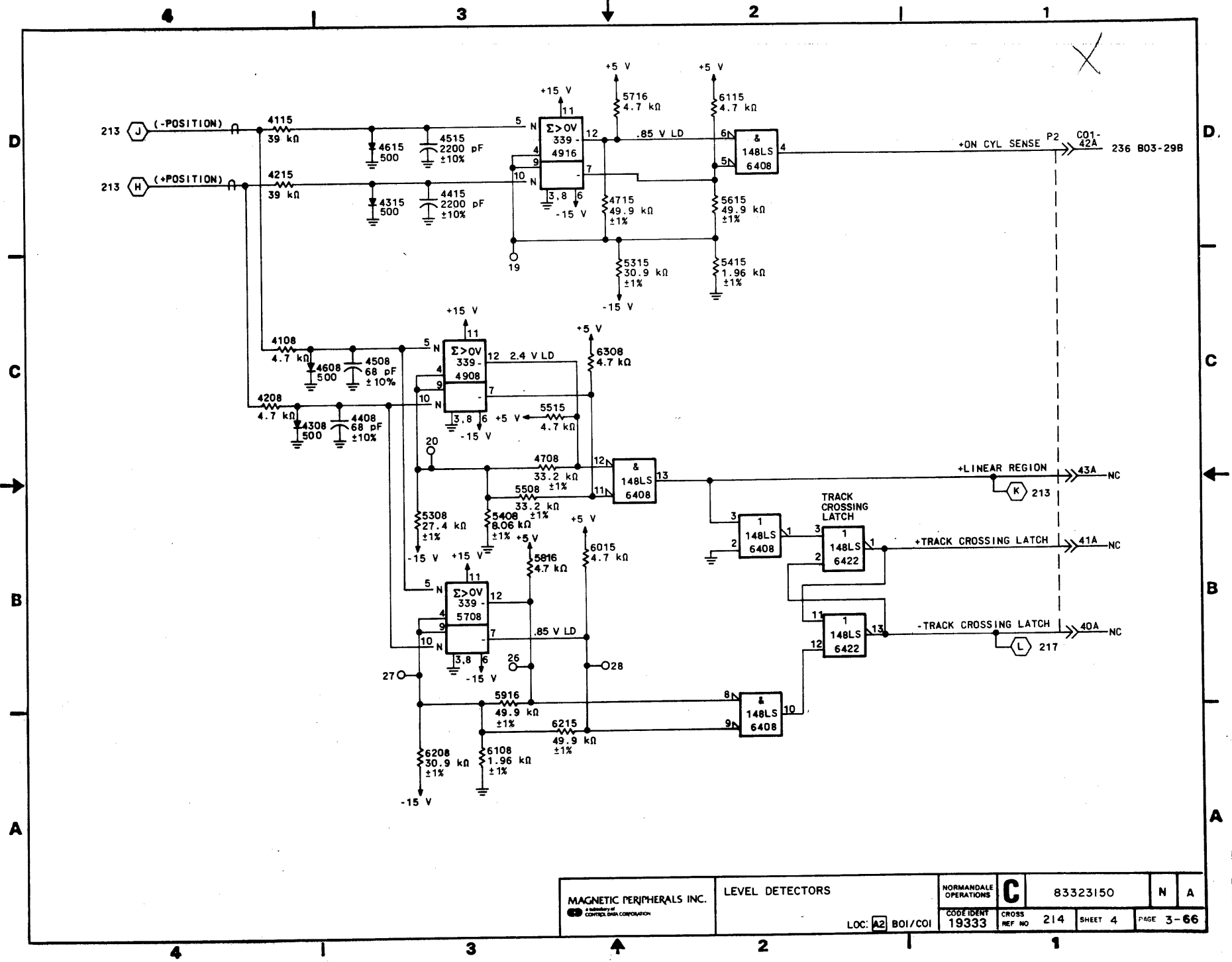


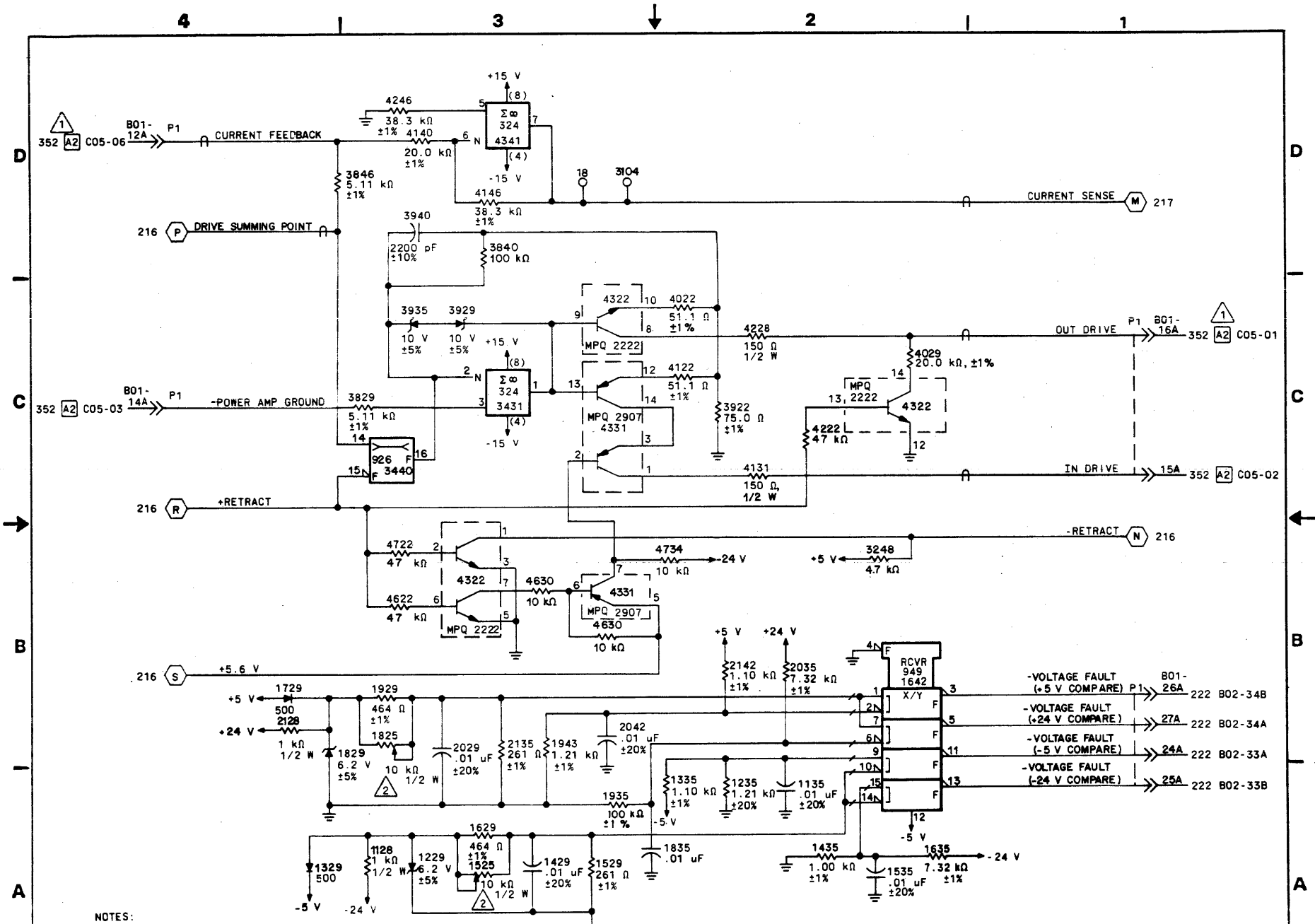
- NOTES:
- 1 ADJUSTABLE.
 - 2 SEE CROSS REF NO 413 FOR CABLING INFORMATION.
 - 3 PRESET IN CARD TEST.
 - 4 THIS LINE IS PART OF A TWISTED PAIR WITH (GND B01-23B → GND A01-23B).

MAGNETIC PERIPHERALS INC. <small>a subsidiary of</small> CONVEX DATA CORPORATION	SERVO DEMODULATOR		NORMANDALE OPERATIONS	C 83323150	N	A
	LOC: A2 B01/COI	CODE IDENT 19333	CROSS REF NO 212		SHEET 2	PAGE 3-64



⚠ RESISTORS AT LOCATIONS 6833 AND 6231 ARE 12.1K (±1%) ON 160 MB UNITS





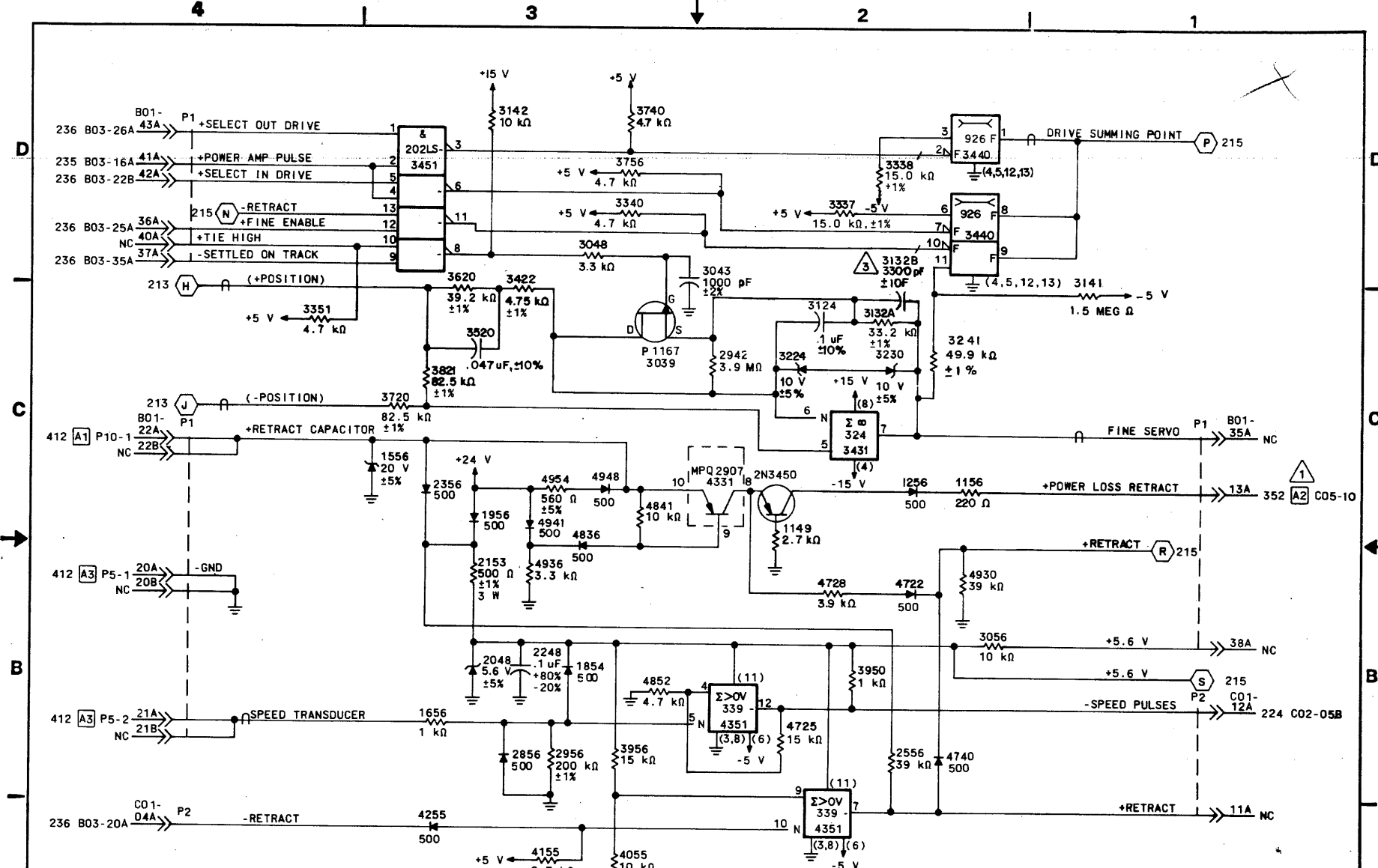
- NOTES:
- 1 SEE CROSS REF NO 413 FOR CABLING INFORMATION.
 - 2 PRESET IN CARD TEST.

MAGNETIC PERIPHERALS INC.
A MEMBER OF
 CONTROL DATA CORPORATION

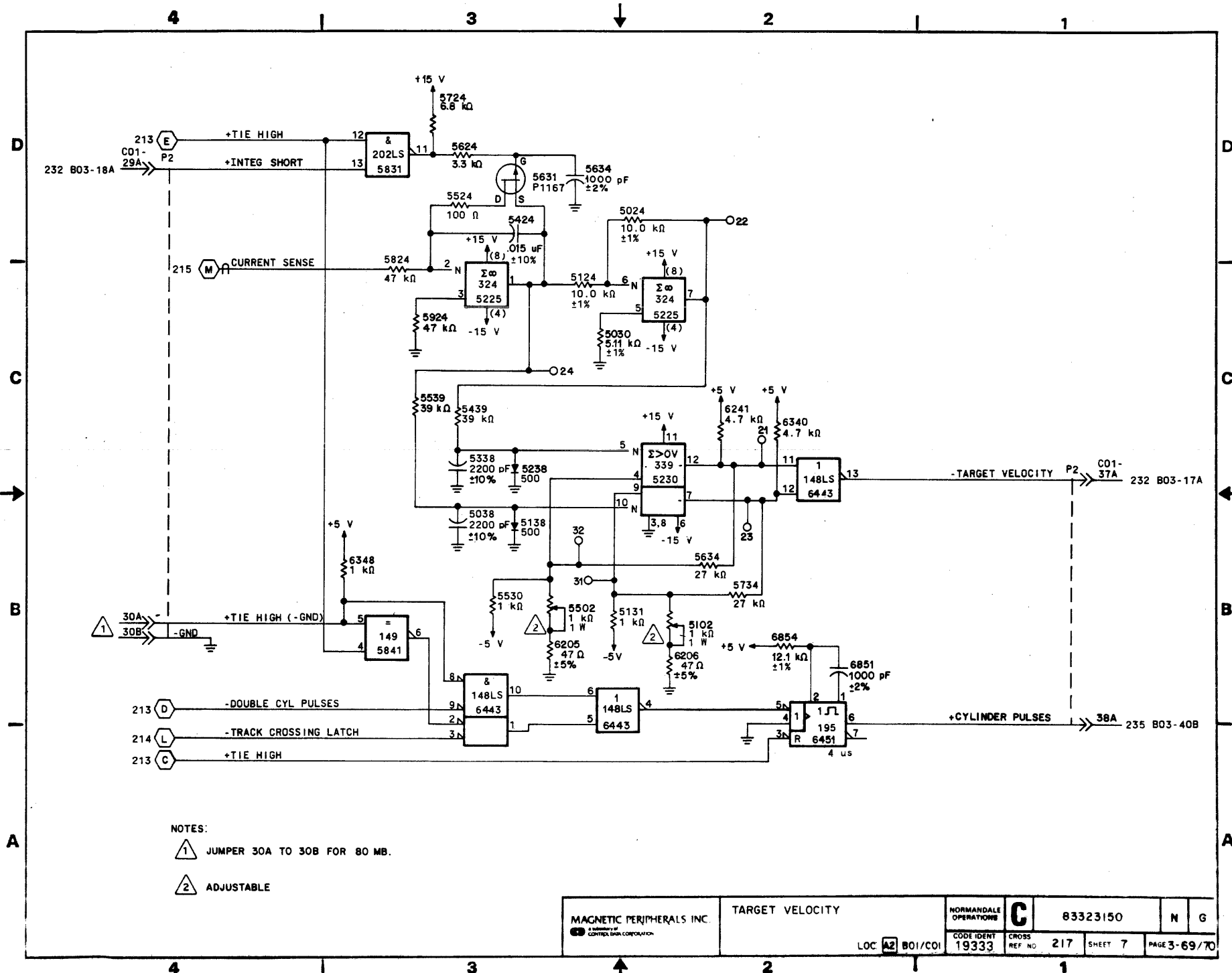
POWER AMP DRIVE AND
 VOLTAGE FAULT

NORMANDAILE OPERATIONS	C	83323150	N	D
CODE IDENT	CROSS REF NO	SHEET	PAGE	
19333	215	5	3-67	

LOC. A2 B01/COI



- NOTES:
- 1 SEE CROSS REF NO 413 FOR CABLING INFORMATION.
 - 2 VALUE OF RESISTOR AT LOCATION 3241 IS 75.0 kΩ (±1%) FOR 160 MB UNITS
 - 3 CAPACITOR ON LKBX CARD ONLY.



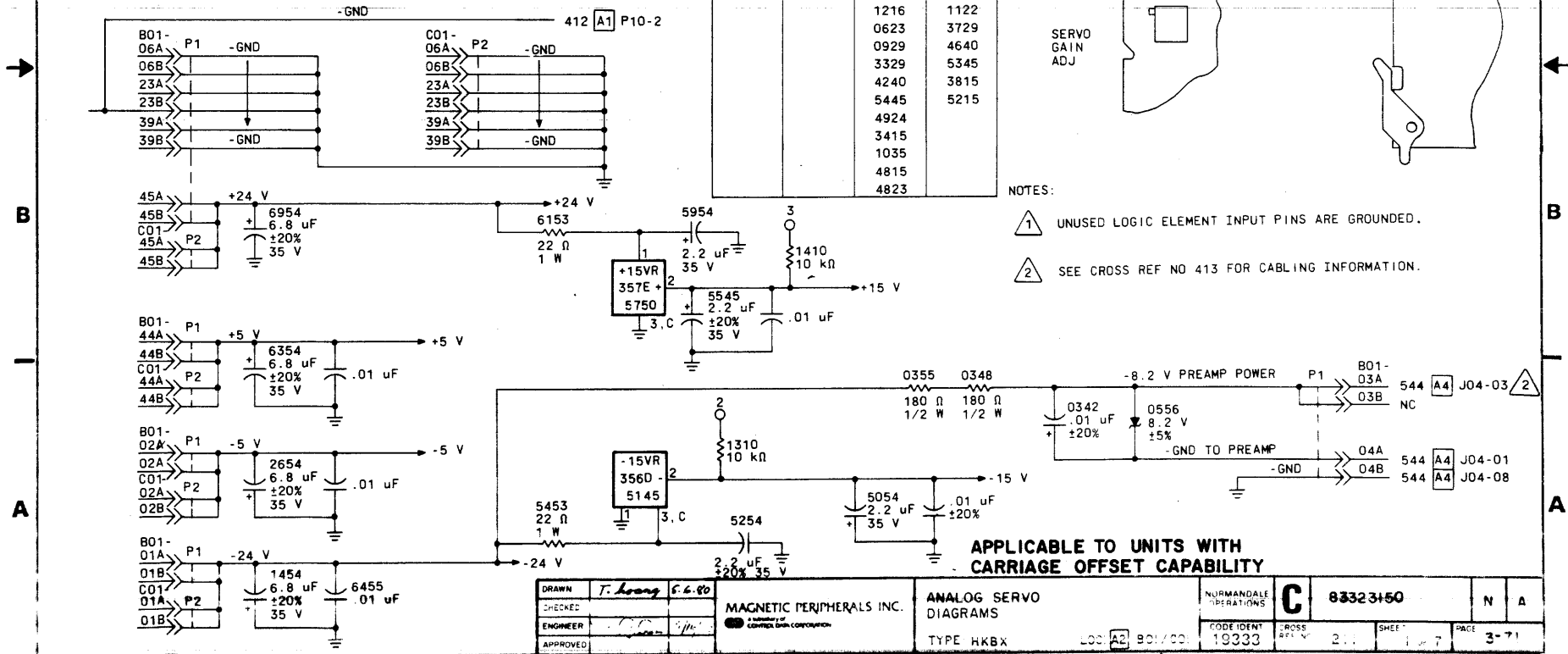
NOTES:
 1 JUMPER 30A TO 30B FOR 80 MB.
 2 ADJUSTABLE

REVISION STATUS OF SHEETS																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A	A	A													

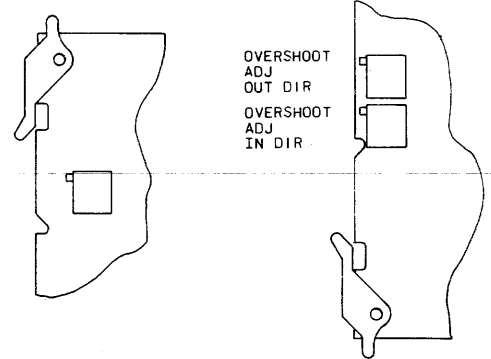
UNUSED LOGIC ELEMENTS		
ELEMENT	LOCATION	OUTPUT PIN(S)
195	6451	9, 10
148LS	6422	4, 10

.01 uF FILTER CAPS			
+5 V	-5 V	+15 V	-15 V
5640	4652	5608	6008
2708	2456	4808	5208
	1735	3408	3808
		1508	1908
		1216	1122
		0623	3729
		0929	4640
		3329	5345
		4240	3815
		5445	5215
		4924	
		3415	
		1035	
		4815	
		4823	

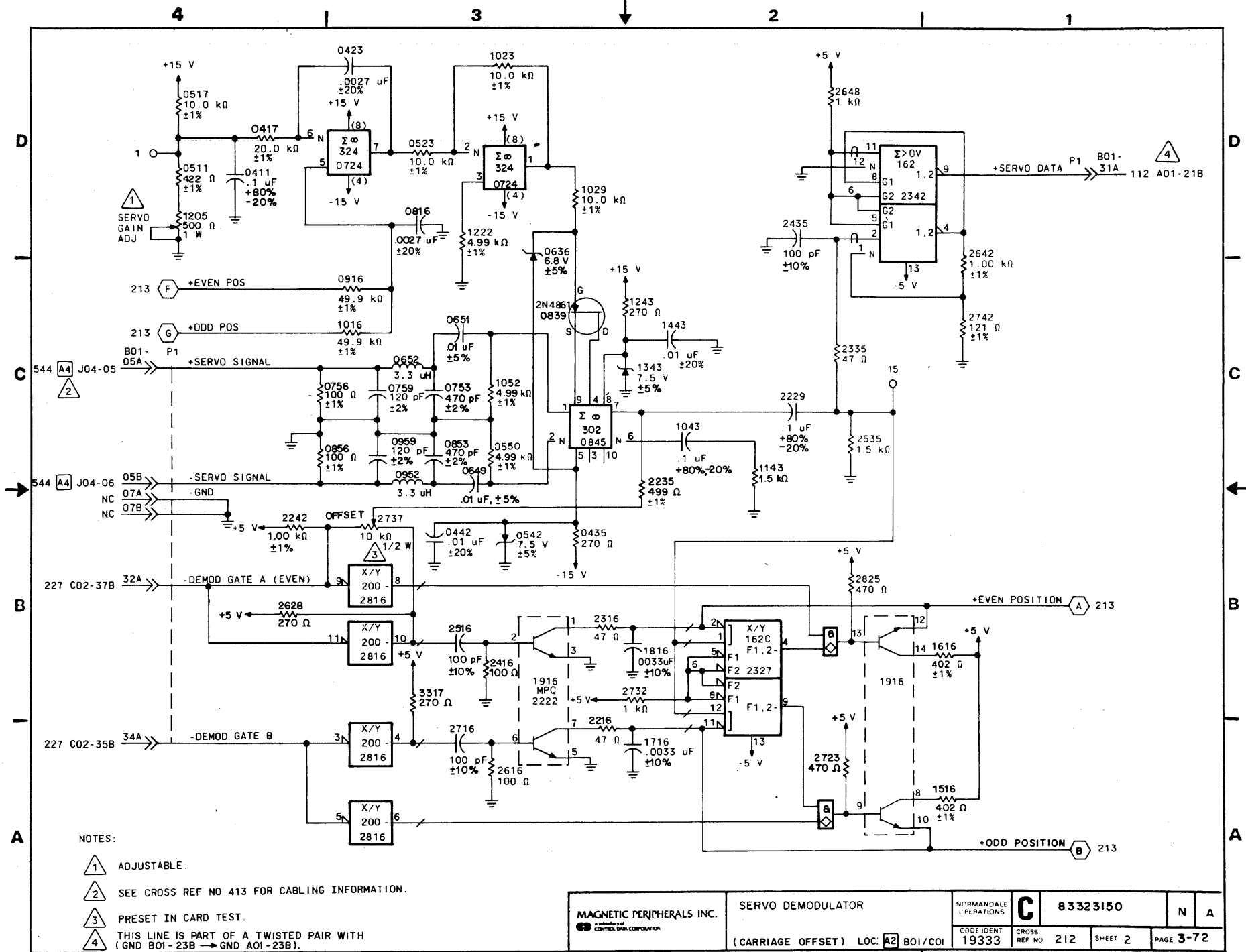
REVISION			
NO.	DESCRIPTION	DATE	BY
A	PE23000 RELEASED	1/10	



- NOTES:
- 1. UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
 - 2. SEE CROSS REF NO 413 FOR CABLING INFORMATION.

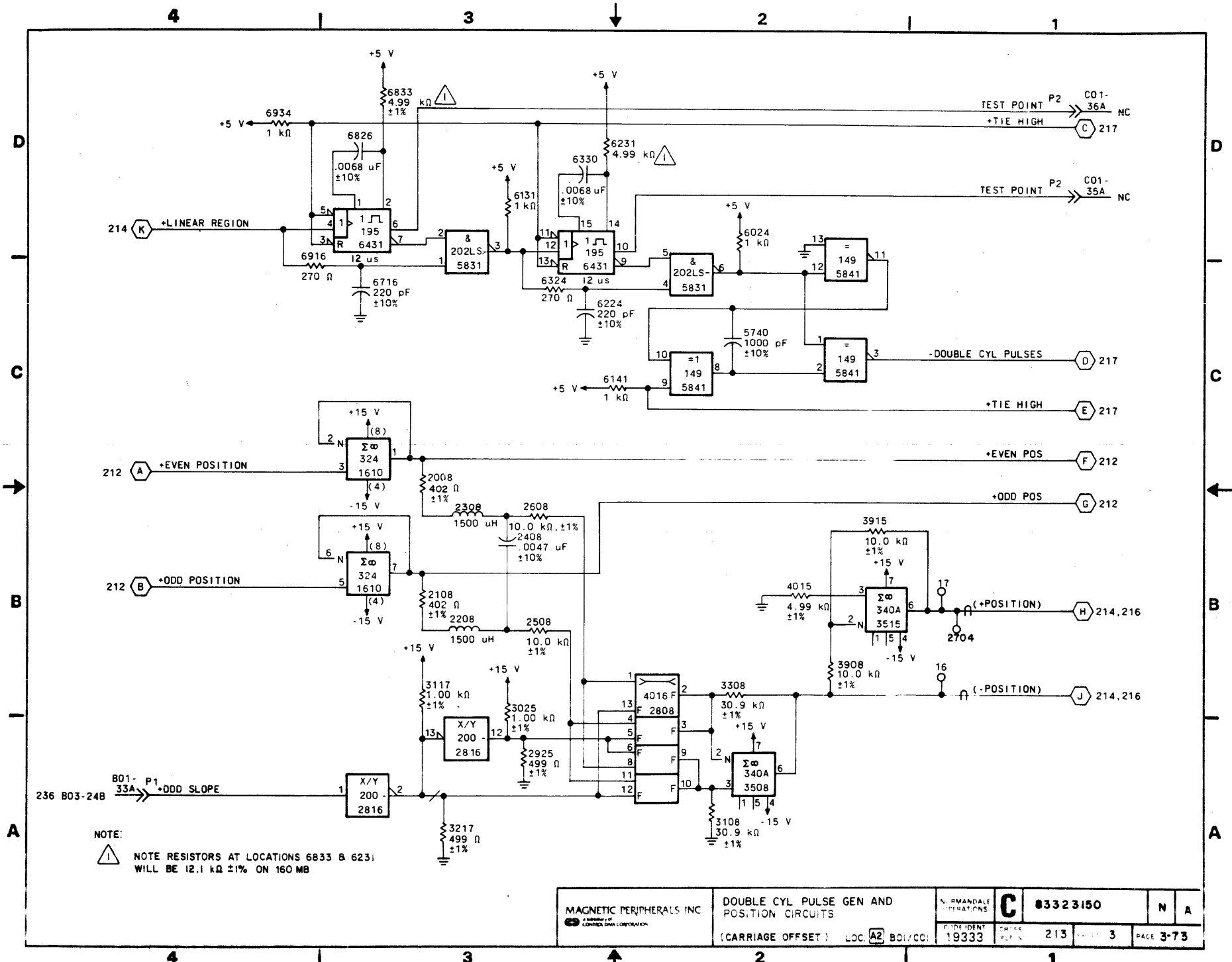


DRAWN: T. Leary 6-6-80 CHECKED: ENGINEER: APPROVED:	MAGNETIC PERIPHERALS INC. a subsidiary of Control Data Corporation	ANALOG SERVO DIAGRAMS TYPE HKBX	NUMERANDALE OPERATIONS C 83323+50 CODE IDENT 19333	SHEET 7 PAGE 3-71
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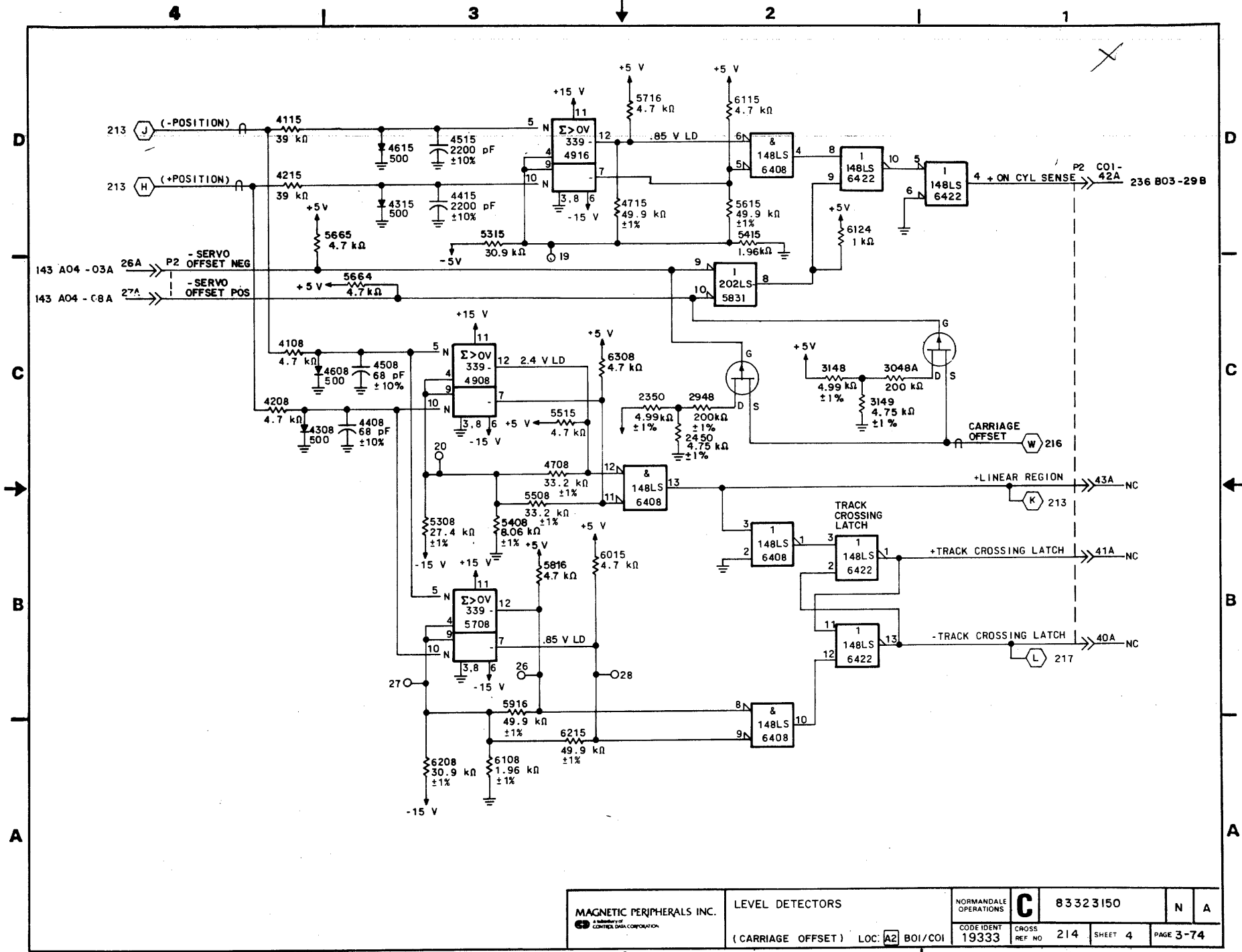


- NOTES:
- 1 ADJUSTABLE.
 - 2 SEE CROSS REF NO 413 FOR CABLING INFORMATION.
 - 3 PRESET IN CARD TEST.
 - 4 THIS LINE IS PART OF A TWISTED PAIR WITH (GND B01-23B → GND A01-23B).

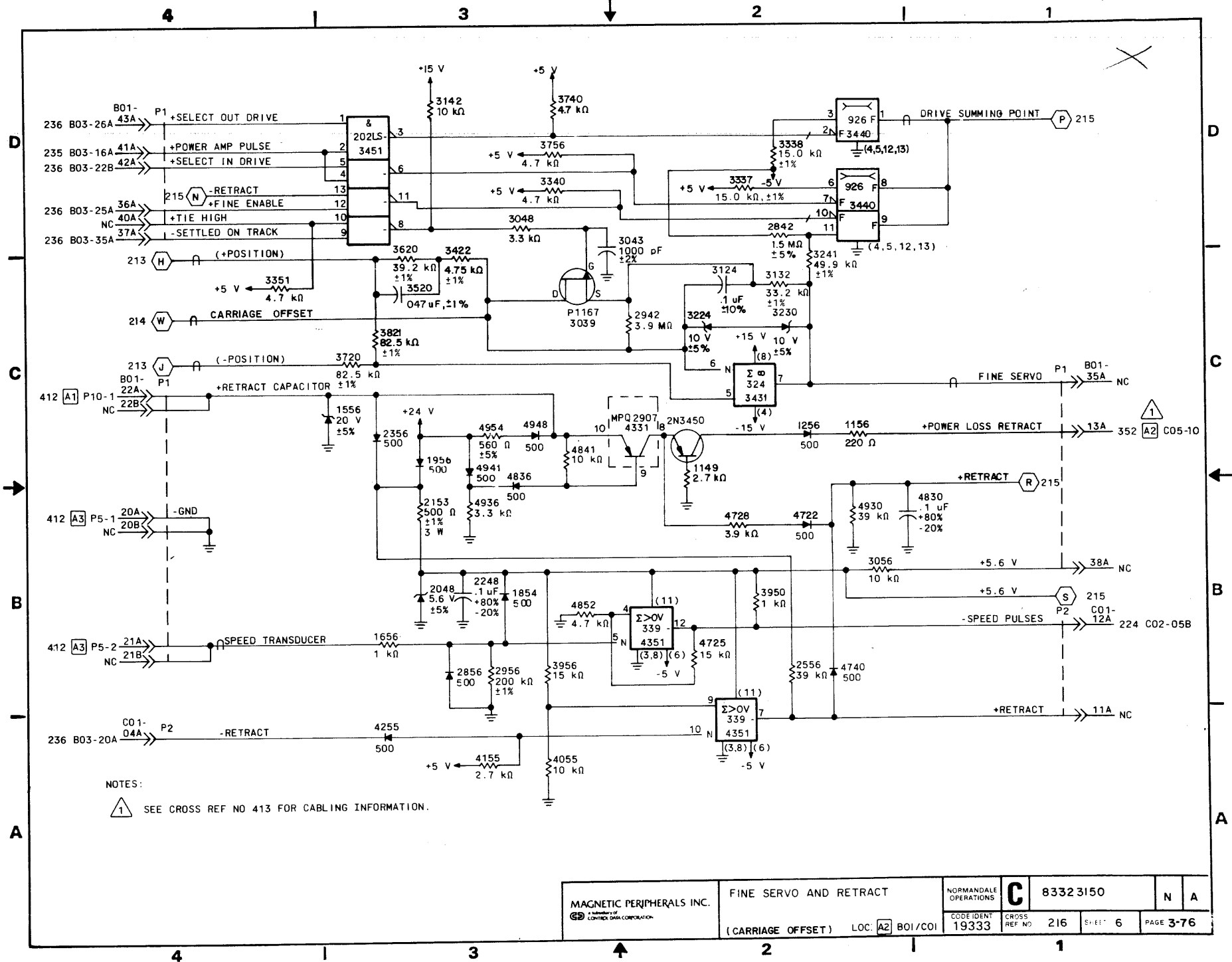
MAGNETIC PERIPHERALS INC. <small>Subsidiary of CONTROL DATA CORPORATION</small>	SERVO DEMODULATOR		NORMANDEALE OPERATIONS	C	83323150	N	A
	(CARRIAGE OFFSET) LOC. A2 B01/COI		CODE IDENT 19333	CROSS REF NO 212	SHEET 2	PAGE 3-72	



NOTE:
 ⚠ NOTE RESISTORS AT LOCATIONS 6833 & 6231
 WILL BE 12.1 kΩ ±1% ON 160 MB

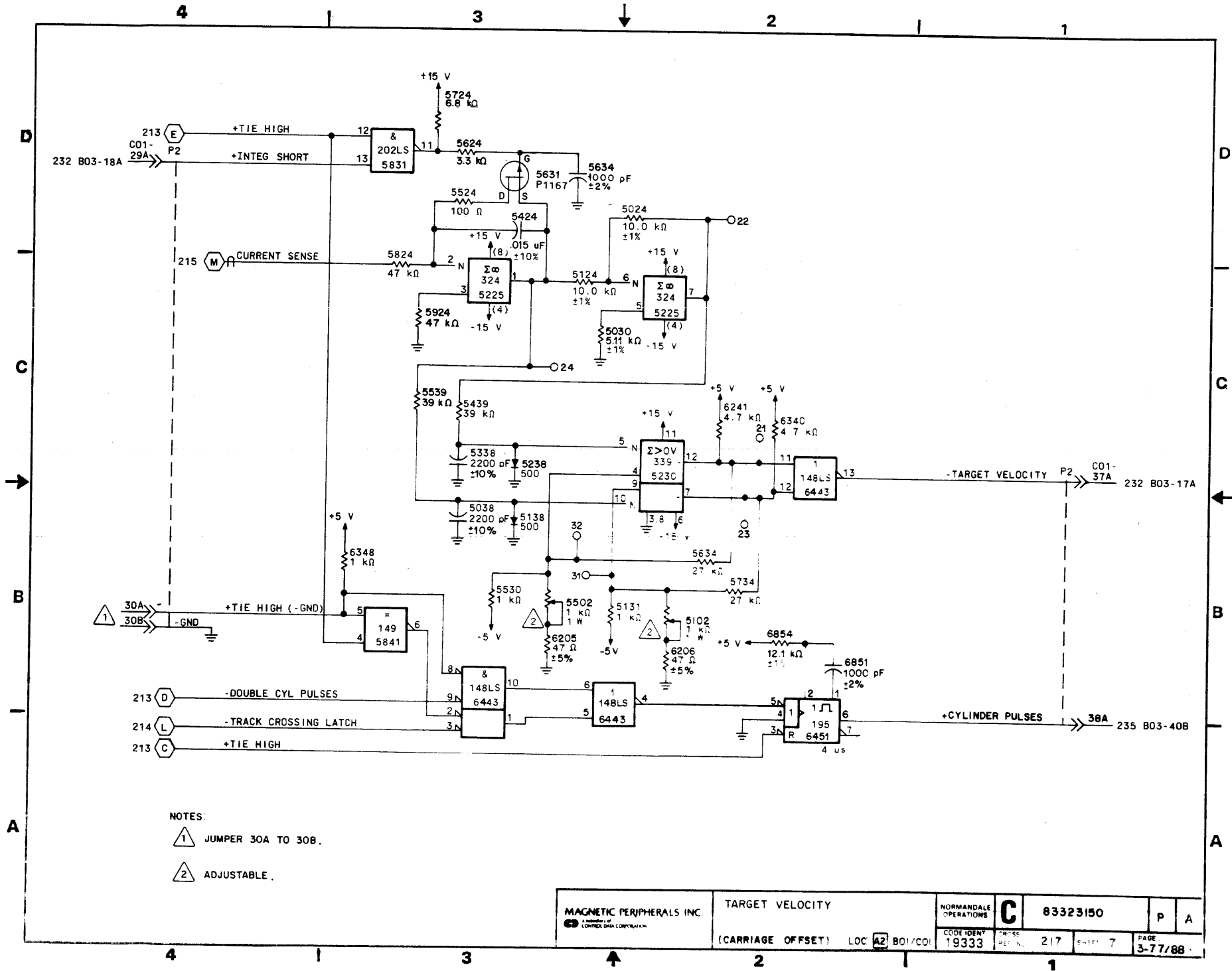


MAGNETIC PERIPHERALS INC. <small>A DIVISION OF</small> <small>CONTROL DATA CORPORATION</small>	LEVEL DETECTORS (CARRIAGE OFFSET) LOC: A2 B01/COI		NORMANDEALE OPERATIONS C 83323150	N A
	CODE IDENT 19333	CROSS REF NO 214	SHEET 4	PAGE 3-74



NOTES:
 1 SEE CROSS REF NO 413 FOR CABLING INFORMATION.

MAGNETIC PERIPHERALS INC. <small>© CONTROL DATA CORPORATION</small>	FINE SERVO AND RETRACT		NORMANDALE OPERATIONS	C 8332 3150	N	A
	(CARRIAGE OFFSET)	LOC: A2 B01/COI	CODE IDENT 19333	CROSS REF NO 216	SHEET 6	PAGE 3-76



NOTES:

- 1 JUMPER 30A TO 30B.
- 2 ADJUSTABLE.

MAGNETIC PERIPHERALS INC. A DIVISION OF CONTRON DATA CORPORATION		TARGET VELOCITY (CARRIAGE OFFSET) LOC A2 BOU/COI		NORMANDEALE OPERATIONS	C	83323150	P	A
CODE IDENY	TRISS	SHEET	PAGE					
19333	217	7	3-77/88					

REVISION STATUS OF SHEETS																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A	A	A	A	A	A											
B	B	B	A	B	B	B	B	A	A											
C	C	C	A	C	C	C	C	A	A											
D	D	D	C	C	C	C	D	A	A											
E	D	D	C	C	C	E	A	A												
F	F	D	C	F	C	F	A	A												
G	G	D	G	F	C	F	A	A												
H	G	D	H	F	C	F	A	A												
J	J	J	J	F	C	F	J	J												
K	J	J	J	F	K	F	J	J												
L	J	J	J	F	K	F	L	J												

UNUSED RESISTOR PACKS

LOCATION	PIN(S)
2809	2, 7, 8
4009	2, 5, 6, 7, 8
5308	2
5809	2

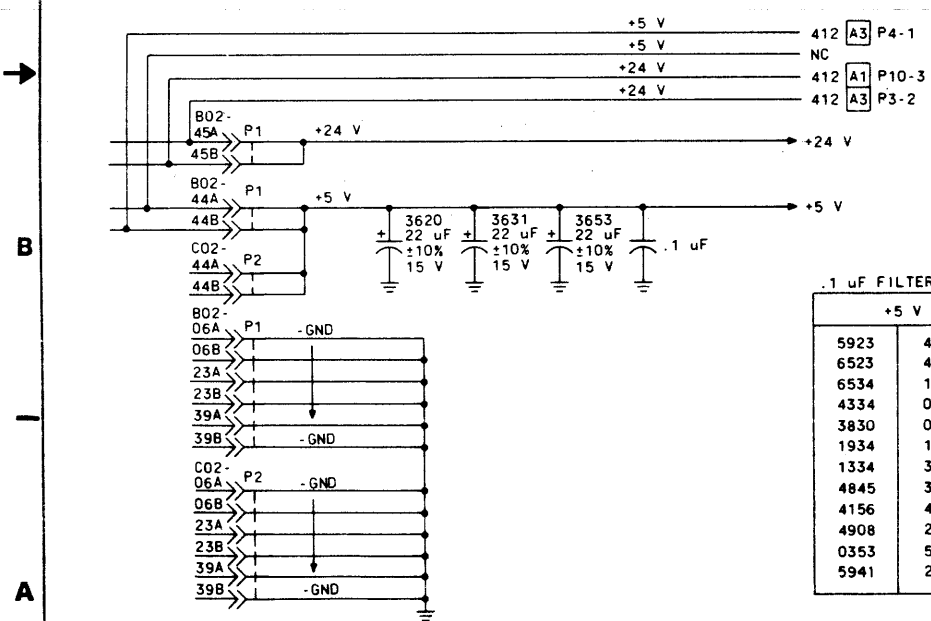
UNUSED TRANSISTOR PACKS

TYPE	LOCATION	PIN(S)
MPQ2222	4443	5, 6, 7

UNUSED LOGIC ELEMENTS

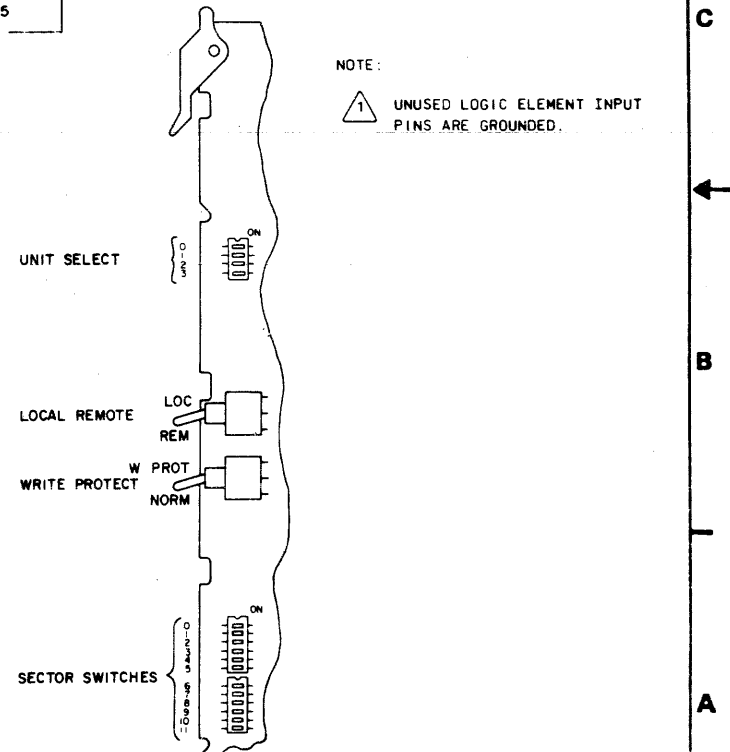
ELEMENT	LOCATION	OUTPUT PIN(S)
146LS	6121	10, 12
149LS	3921	8
175LS	4432	8, 9
554LS	2153	4
4049	2120	10
226LS	2143	5

REVISIONS					
REV.	ECN.	DESCRIPTION	DRFT	DATE	CHK'D
A	PE23000	RELEASED		5-11-79	MLC
B	PE50603	ADD TWISTED PAIR	WA	9-13-79	MLC
C	PE49446	CORRECT LOGIC DIA	WA	9-13-79	MLC
D	PE50681	FGX COMP CHG	CB	11-11-79	MLC
E	PL50681A	FGX COMP CHG	TR	12-4-79	MLC
F	PE50705	CORRECT LD	TR	12-4-79	MLC
G	PE50870	CHG CARDS	CB	4-18-80	MLC
H	PE62029	CFBX TO FFBX	H	5-14-80	
J	PE50070	TFBX TO WFBX			
Z	PE62165	CORRECTIONS	MF	1-12-81	DD
L	DJO2234	MOVE RESISTOR AND CAPACITOR	MJ	3-2-82	(6)



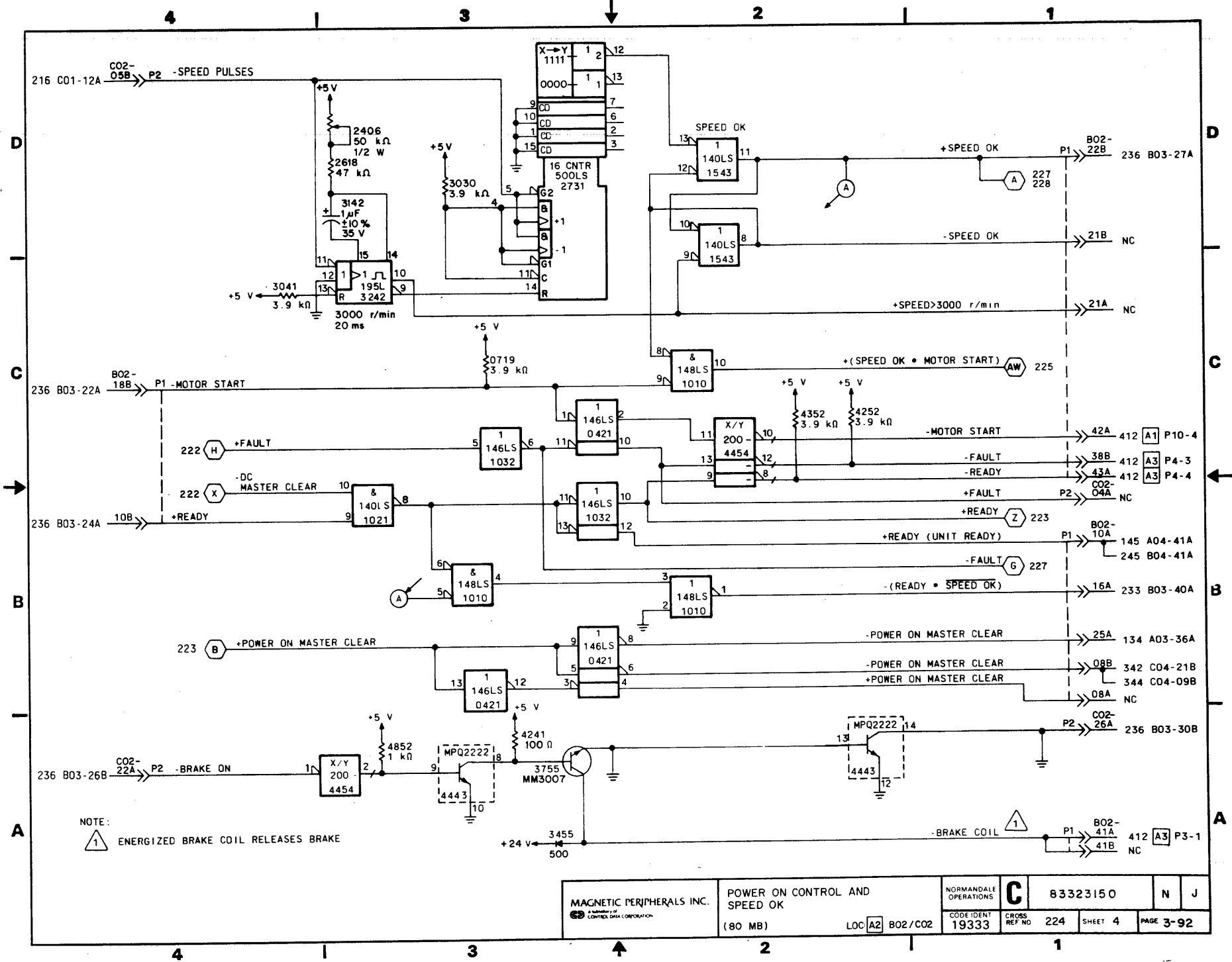
.1 uF FILTER CAPS

+5 V	
5923	4808
6523	4212
6534	1412
4334	0323
3830	0923
1934	1319
1334	3123
4845	3523
4156	4823
4908	2539
0353	5356
5941	2052



APPLICABLE ONLY TO 80 MB UNITS

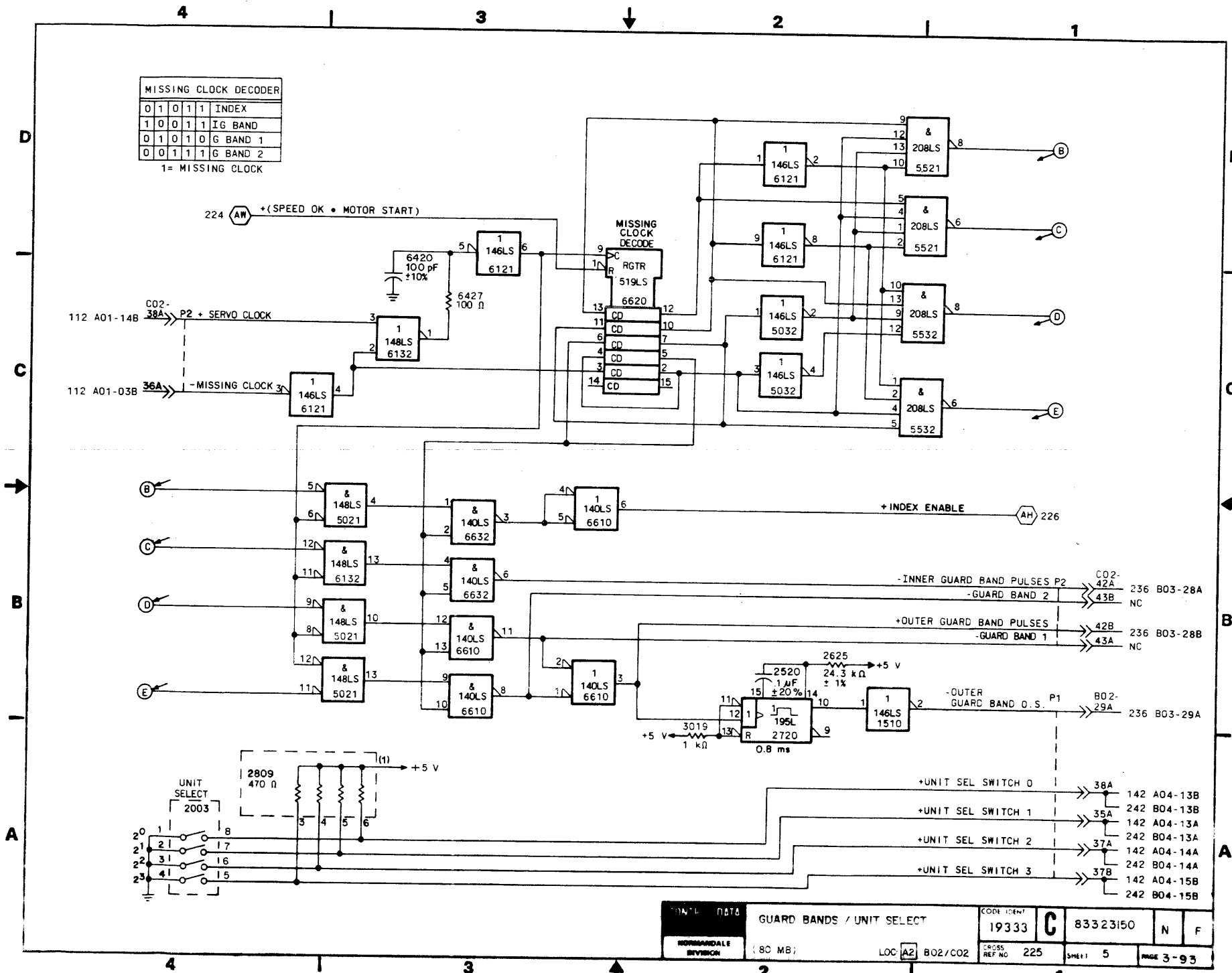
DRAWN: G. Lagace 4.9.79 CHECKED: S.K. Johnson 9/25/79 ENGINEER: P. D. Smith 5/3/79 APPROVED:	MAGNETIC PERIPHERALS INC. <small>a subsidiary of</small> COMDEX DATA CORPORATION	FAULT / CONTROL DIAGRAMS TYPE: WFBX LOC: A2 B02/CO2	NORMALDALS OPERATIONS C 83323150 V L CODE IDENT: 19333 CROSS REF: 221 SHEET: 1 of 9 PAGE: 3-89
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NOTE:
 ENERGIZED BRAKE COIL RELEASES BRAKE

MISSING CLOCK DECODER					
0	1	0	1	1	INDEX
1	0	0	1	1	IG BAND
0	1	0	1	0	G BAND 1
0	0	1	1	1	G BAND 2

1 = MISSING CLOCK



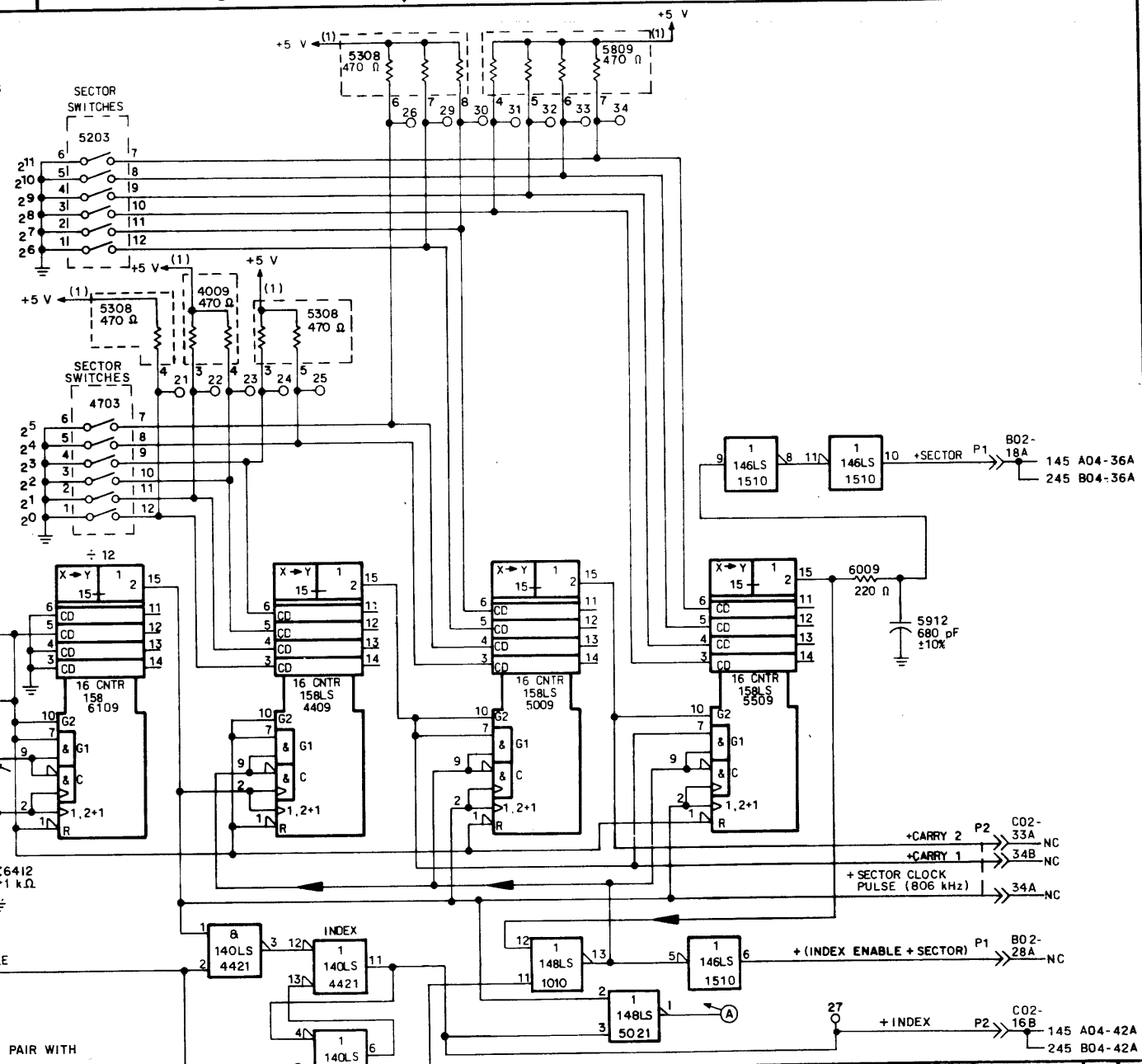
SWITCH POSITIONS FOR EVEN LENGTH SECTORS

SECTORS	0	1	2	3	4	5	6	7	8	9	10	11
4	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0
128	+	+	+	+	+	+	+	+	+	+	+	+

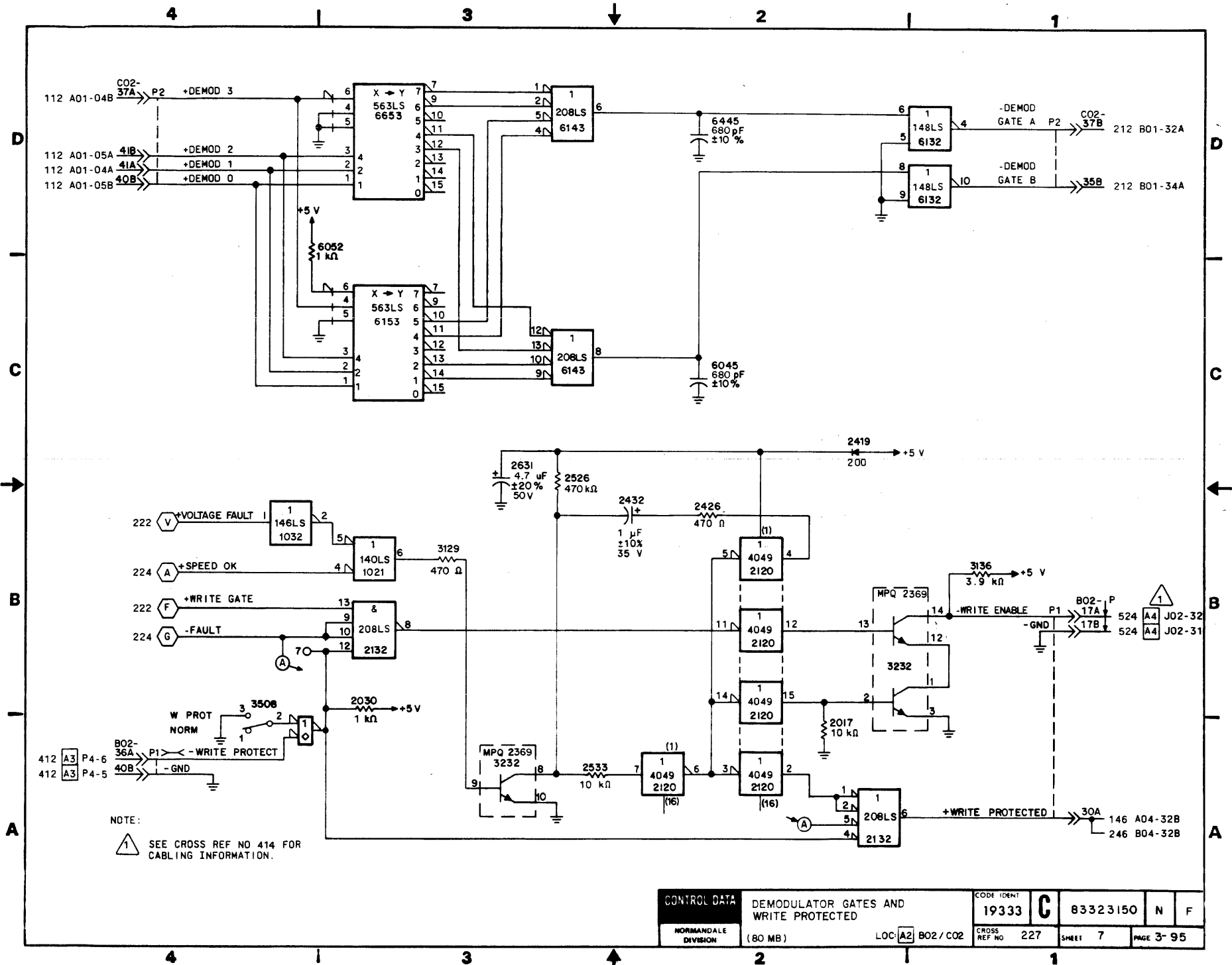
+ = OPEN
0 = CLOSED

1 THIS LINE IS PART OF A TWISTED PAIR WITH (GND A01-06B → C02-39A)

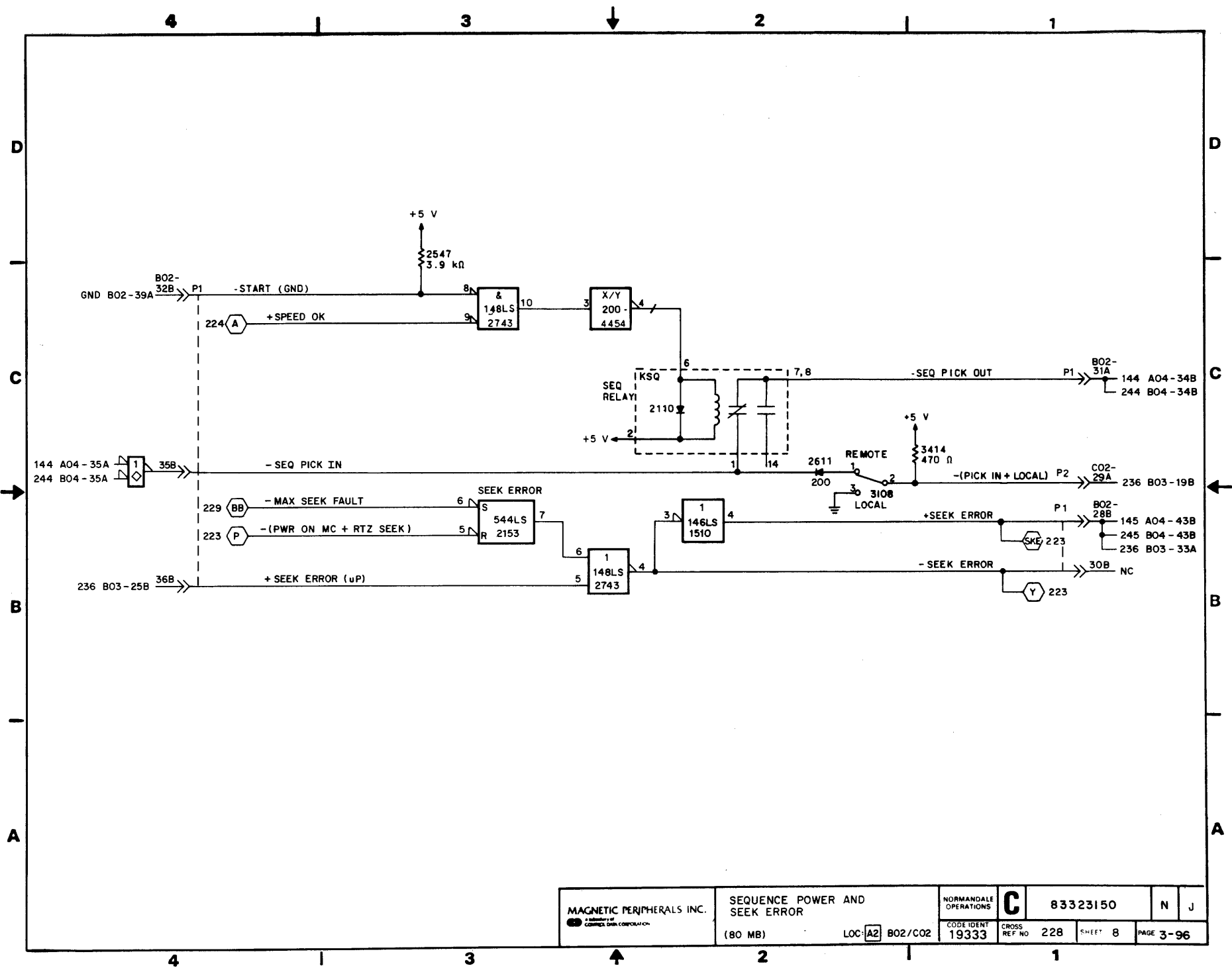
NOTE:
1 THIS LINE IS PART OF A TWISTED PAIR WITH (GND A01-06B → C02-39A)



CONTROL DATA		SECTOR COUNTER		CODE IDENT		19333		C		83323150		N		K	
NORMANDEALE DIVISION		(80 MB)		LOC: A2		B02/C02		CROSS REF NO: 226		SHEET: 6		PAGE: 3-94			



CONTROL DATA		DEMODULATOR GATES AND WRITE PROTECTED		CODE IDENT	19333	C	83323150	N	F
NORMANDEALE DIVISION		(80 MB)		CROSS REF NO	227	SHEET	7	PAGE 3-95	
		LOC A2		BO2 / CO2					



MAGNETIC PERIPHERALS INC. <small>a subsidiary of GEORGE EASTMAN CORPORATION</small>	SEQUENCE POWER AND SEEK ERROR (80 MB)		NORMANDALE OPERATIONS	C	83323150	N	J
	LOC: A2 B02/C02	CODE IDENT 19333	CROSS REF NO 228	SHEET 8	PAGE 3-96		

REVISION STATUS OF SHEETS									
1	2	3	4	5	6	7	8	9	
A	A	A	A	A	A	-	A	A	A
B	B	B	B	B	A	-	B	A	A
C	C	C	B	C	A	-	C	A	A
D	C	C	B	C	A	-	D	A	A
E	E	C	B	E	A	-	E	A	A
F	F	C	F	E	A	-	E	A	A
G	G	C	G	E	A	G	E	G	G
H	G	H	G	E	A	G	E	G	G

UNUSED RESISTOR PACKS

LOCATION	PIN(S)
2809	2, 7, 8
4009	2, 5, 6, 7, 8
5308	2
5809	2

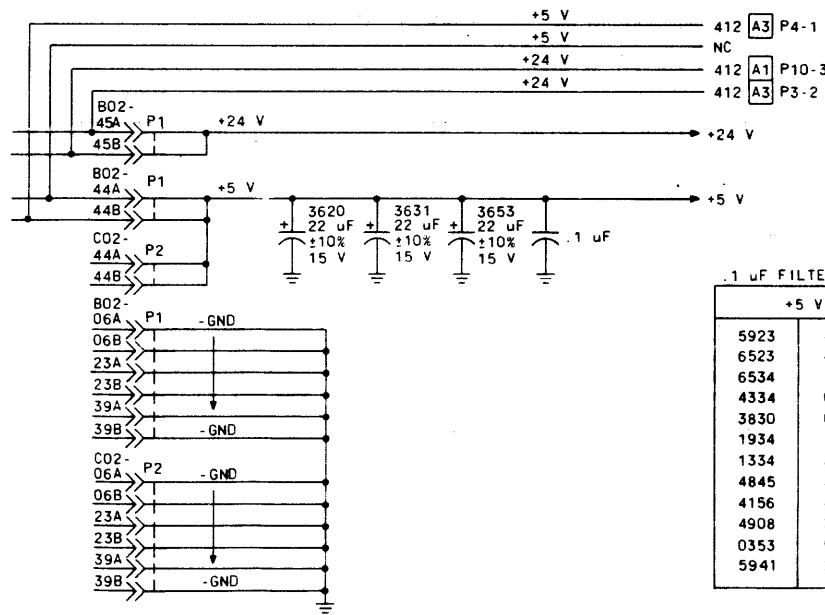
UNUSED TRANSISTOR PACKS

TYPE	LOCATION	PIN(S)
MPQ2222	4443	5, 6, 7

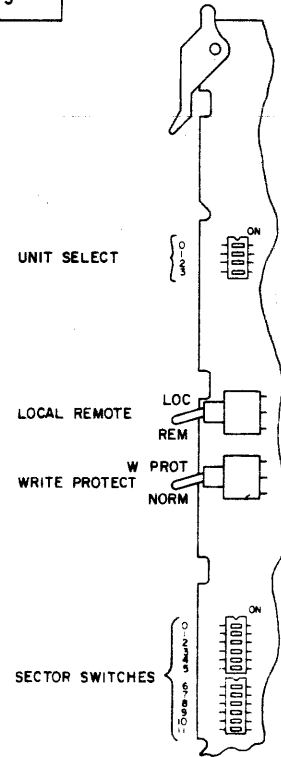
UNUSED LOGIC ELEMENTS

ELEMENT	LOCATION	OUTPUT PIN(S)
146 LS	F121	10, 12
149 LS	3921	8
175 LS	4432	8, 9
554 LS	2153	4
4049	2120	10
226 LS	2143	5

REVISIONS					
REV	ECC	DESCRIPTION	DMFT	DATE	CHK'D
A	PE23000	RELEASED			
B	PE49146	CORRECT LOGIC DIA	MA	12/2/78	
C	PE50681	FGX COMP CHGS	CB		
D	PE50681A	FGX COMP CHGS	TH	12/2/78	
E	PE50705	CORREC LD	TH	12/2/78	
F	PE50870	CHG CARDS	CB	12/2/78	
G	PE62084	SFGX TO XFGX	TH	5-26-80	
H	DJ02199	CORRECTION	MJ	1-6-82	



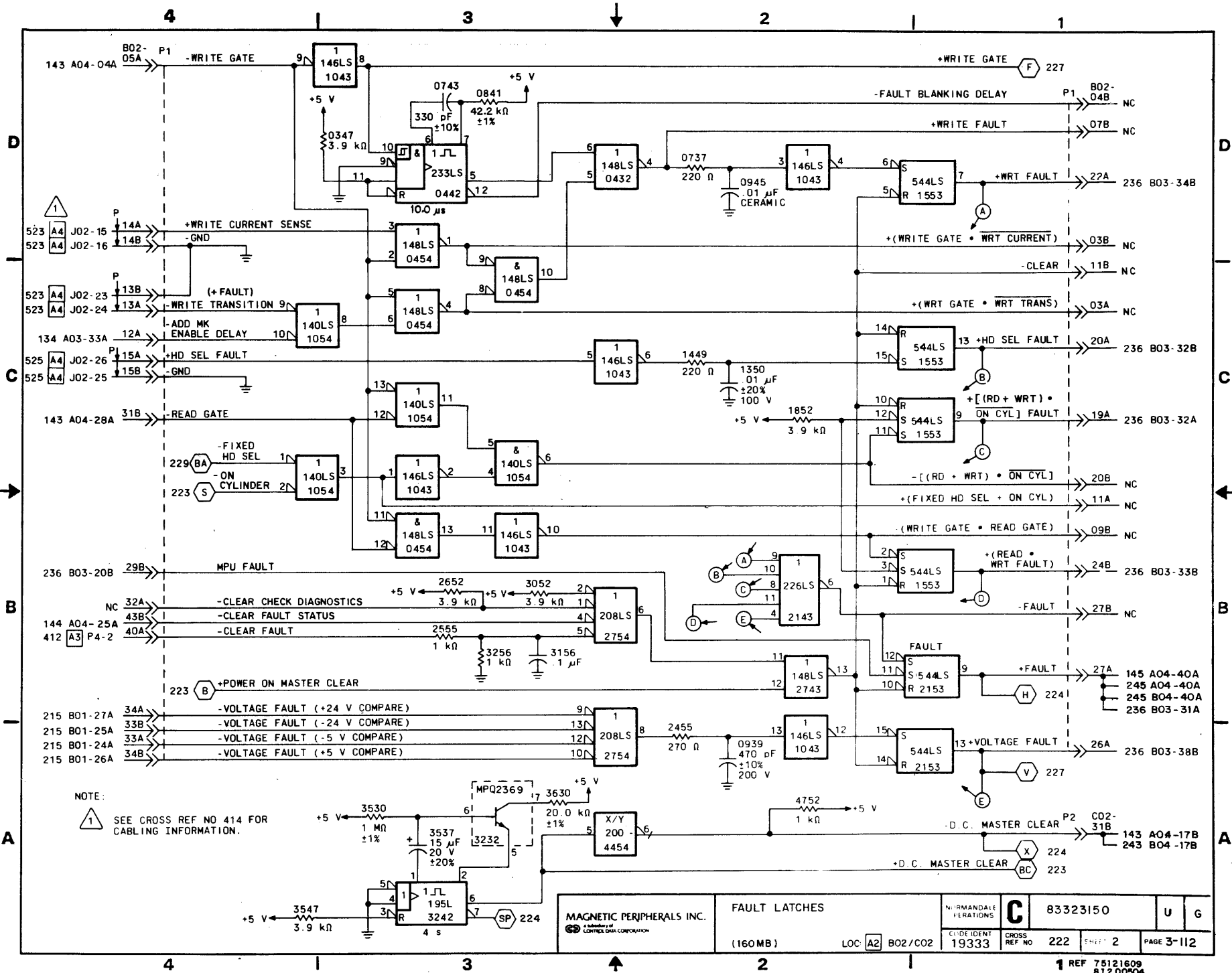
.1 uF FILTER CAPS	
+5 V	
5923	4808
6523	4212
6534	1412
4334	0323
3830	0923
1934	1319
1334	3123
4845	3523
4156	4823
4908	2539
0353	5356
5941	2052



NOTE: UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.

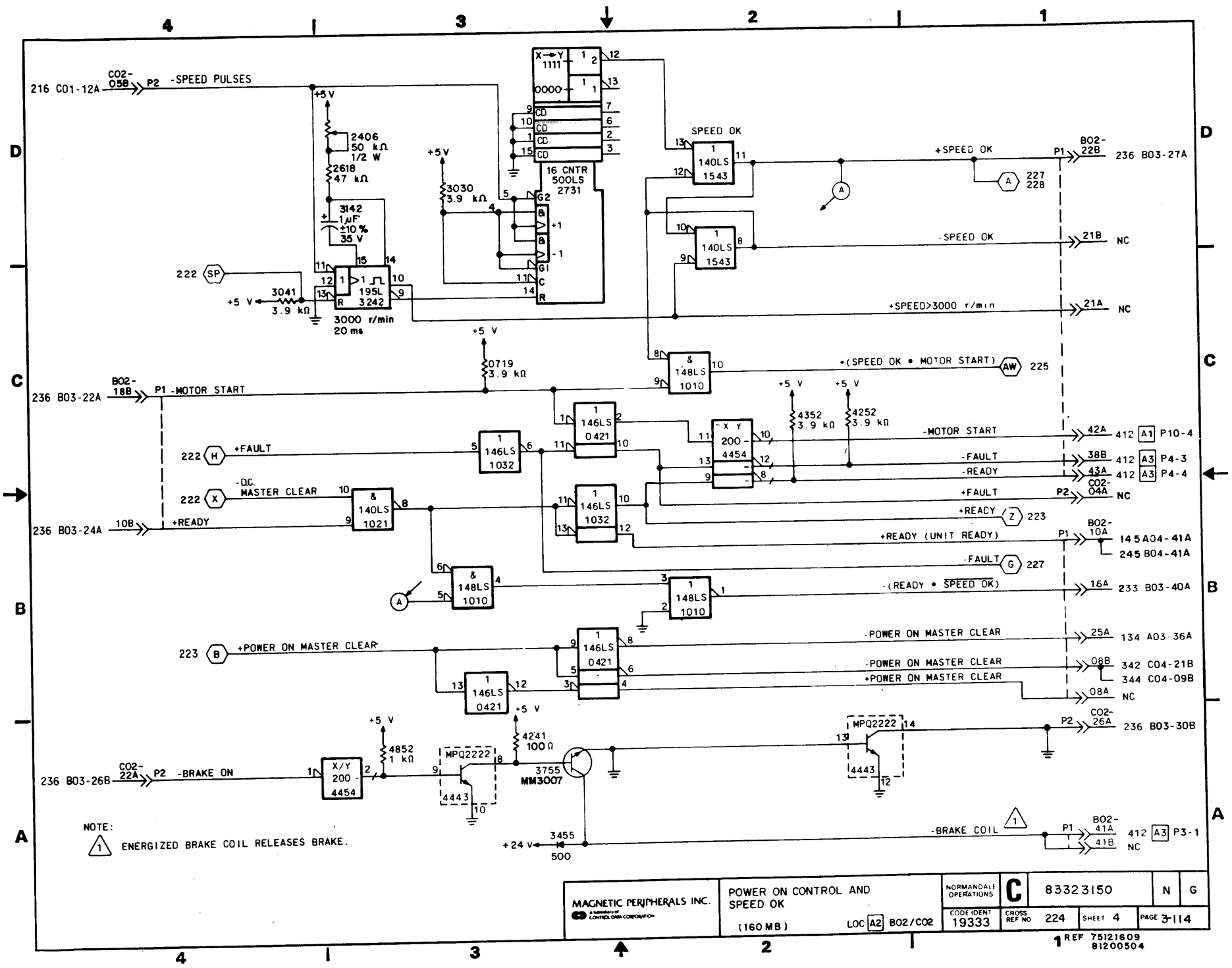
APPLICABLE ONLY TO 160MB UNITS

RAWN	G. Raine	MAGNETIC PERIPHERALS INC.	FAULT / CONTROL DIAGRAMS	NORMANDE	C	83323150	U	H
DATE	12/2/78	TYPE: XFGX	LOC: A21	BO2/CO2	19333	REF NO: 221	SHEET: 1 of 9	PAGE: 3-111



NOTE:
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

MAGNETIC PERIPHERALS INC. <small>A DIVISION OF CONTROL DATA CORPORATION</small>	FAULT LATCHES		NUMERICAL IDENTIFICATION	C	83323150	U	G
	(160MB)	LOC A2 B02/C02	CUIDE IDENT 19333				



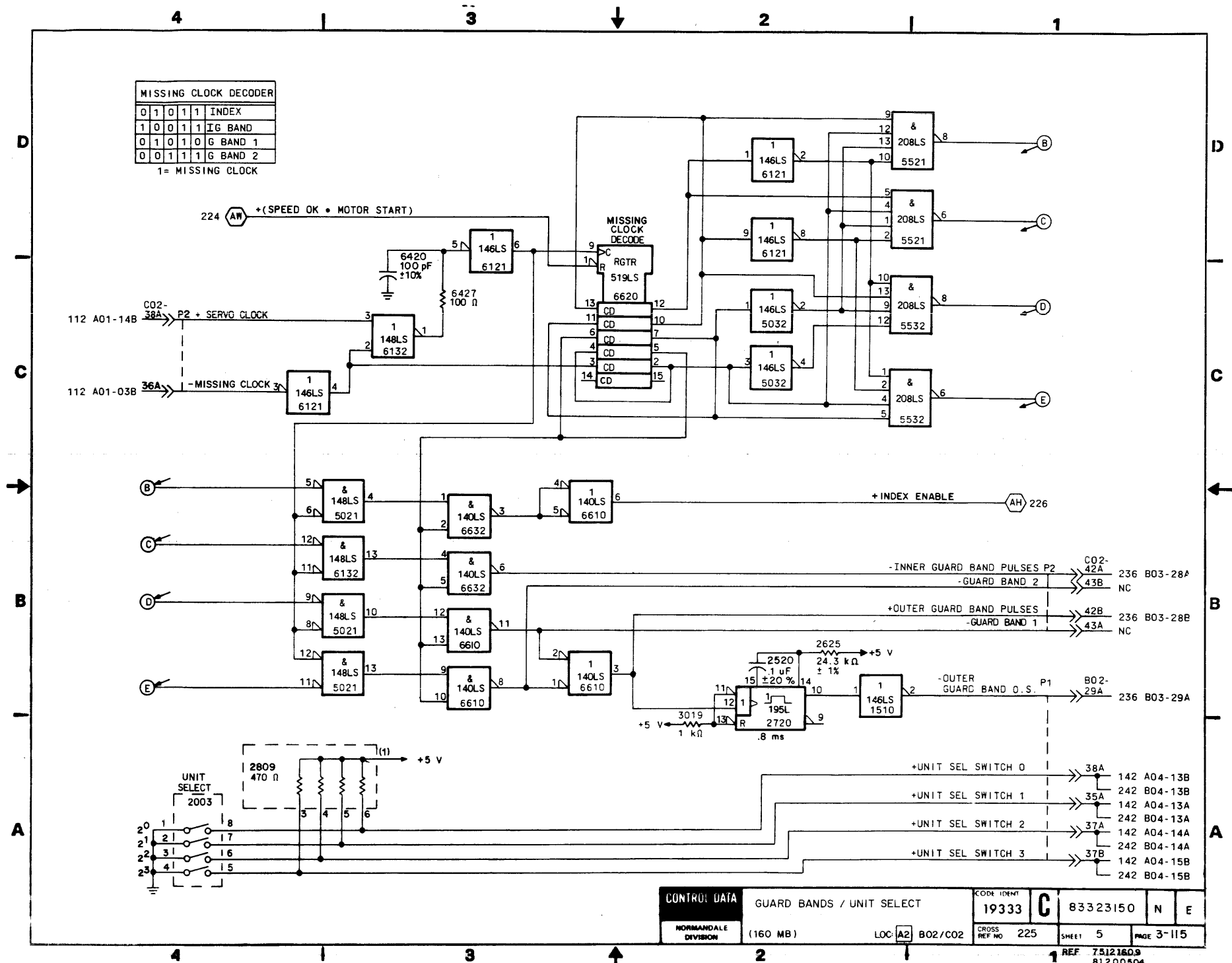
NOTE:
 1 ENERGIZED BRAKE COIL RELEASES BRAKE.

MAGNETIC PERIPHERALS INC. <small>a subsidiary of CONTROL DATA CORPORATION</small>	POWER ON CONTROL AND SPEED OK (160 MB)		NORMANDALE OPERATIONS	C 83323150	N G
	LOC A2 B02/C02	CODE IDENT 19333	CROSS REF NO 224	SHEET 4	PAGE 3-114

1 REF 75121609
 81200504

MISSING CLOCK DECODER				
0	1	0	1	INDEX
1	0	0	1	I G BAND
0	1	0	1	G BAND 1
0	0	1	1	G BAND 2

1 = MISSING CLOCK



CONTR. DATA

GUARD BANDS / UNIT SELECT

CODE IDENT

19333

C

83323150

N

E

NORMANDEALE DIVISION

(160 MB)

LOC: A2

B02/CO2

CROSS REF NO 225

SHEET 5

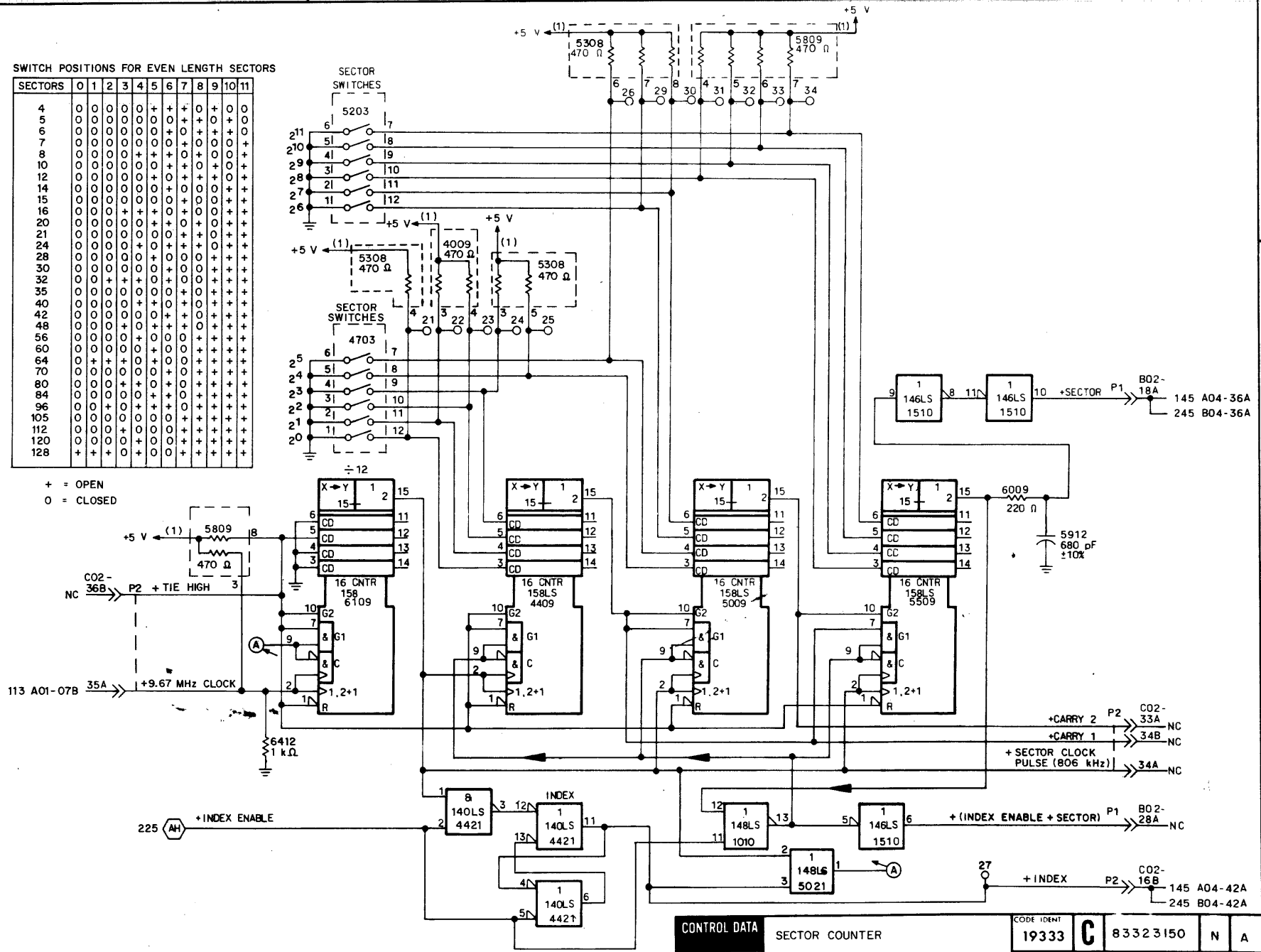
PAGE 3-115

REF 7512160.9
81200504

SWITCH POSITIONS FOR EVEN LENGTH SECTORS

SECTORS	0	1	2	3	4	5	6	7	8	9	10	11
4	0	0	0	0	+	+	+	+	+	+	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0
128	+	+	+	+	+	+	+	+	+	+	+	+

+ = OPEN
0 = CLOSED



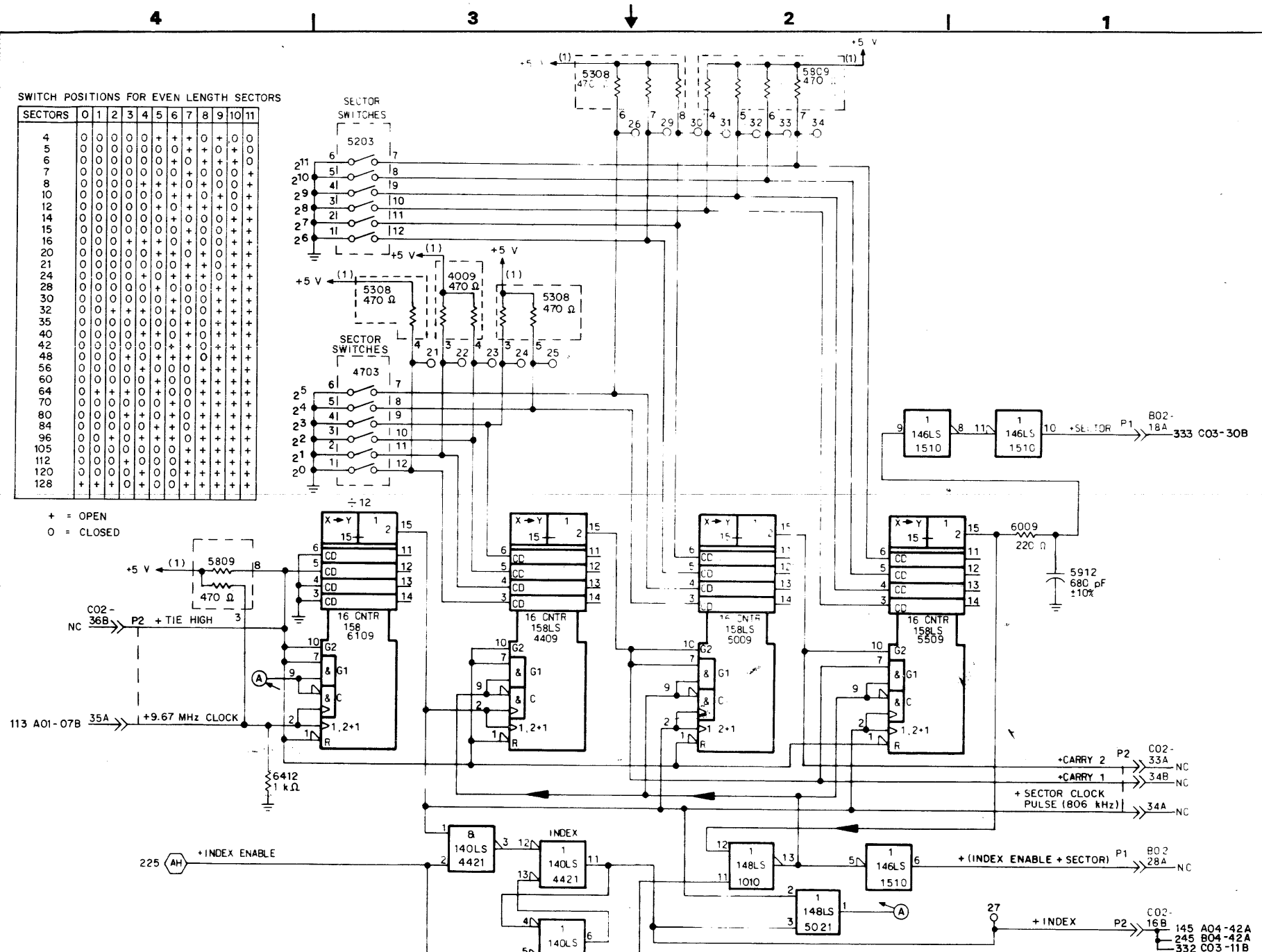
APPLICABLE ONLY TO UNITS WITHOUT LONG LAST SECTOR.

CONTROL DATA NORMANDALE DIVISION	SECTOR COUNTER (160 MB)	CODE IDENT 19333	C	83323150	N	A
	LOC: A2 BO2/CO2	CROSS REF NO 226				

SWITCH POSITIONS FOR EVEN LENGTH SECTORS

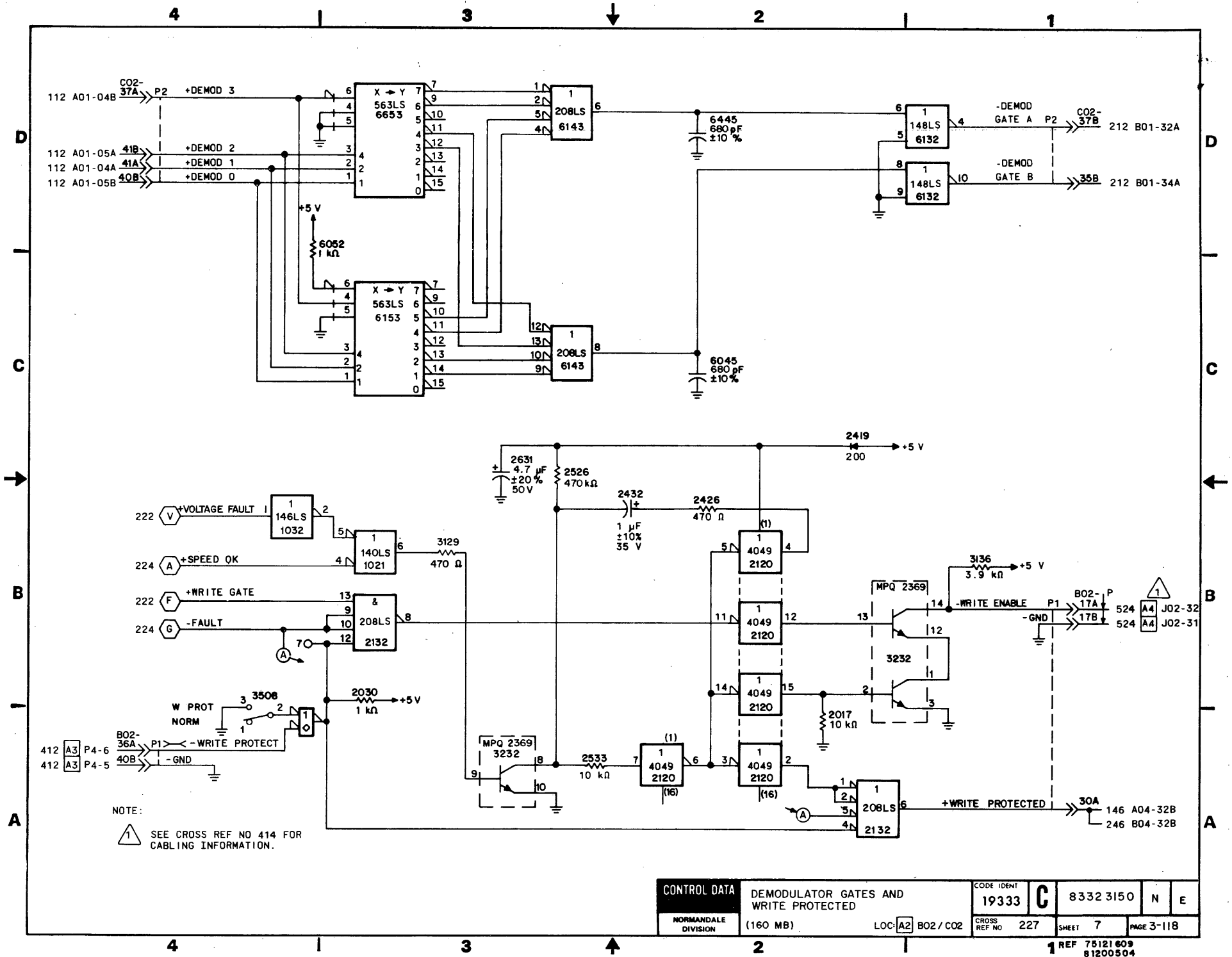
SECTORS	0	1	2	3	4	5	6	7	8	9	10	11
4	0	0	0	0	+	+	+	+	0	+	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	0	0	0	0	+	+	+	+	0	+	+	+
20	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	+	+	+	+	0	+	+	+
35	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0
70	0	0	0	0	0	0	0	0	0	0	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0
84	0	0	0	0	0	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0
128	+	+	+	+	0	0	0	0	+	+	+	+

+ = OPEN
0 = CLOSED



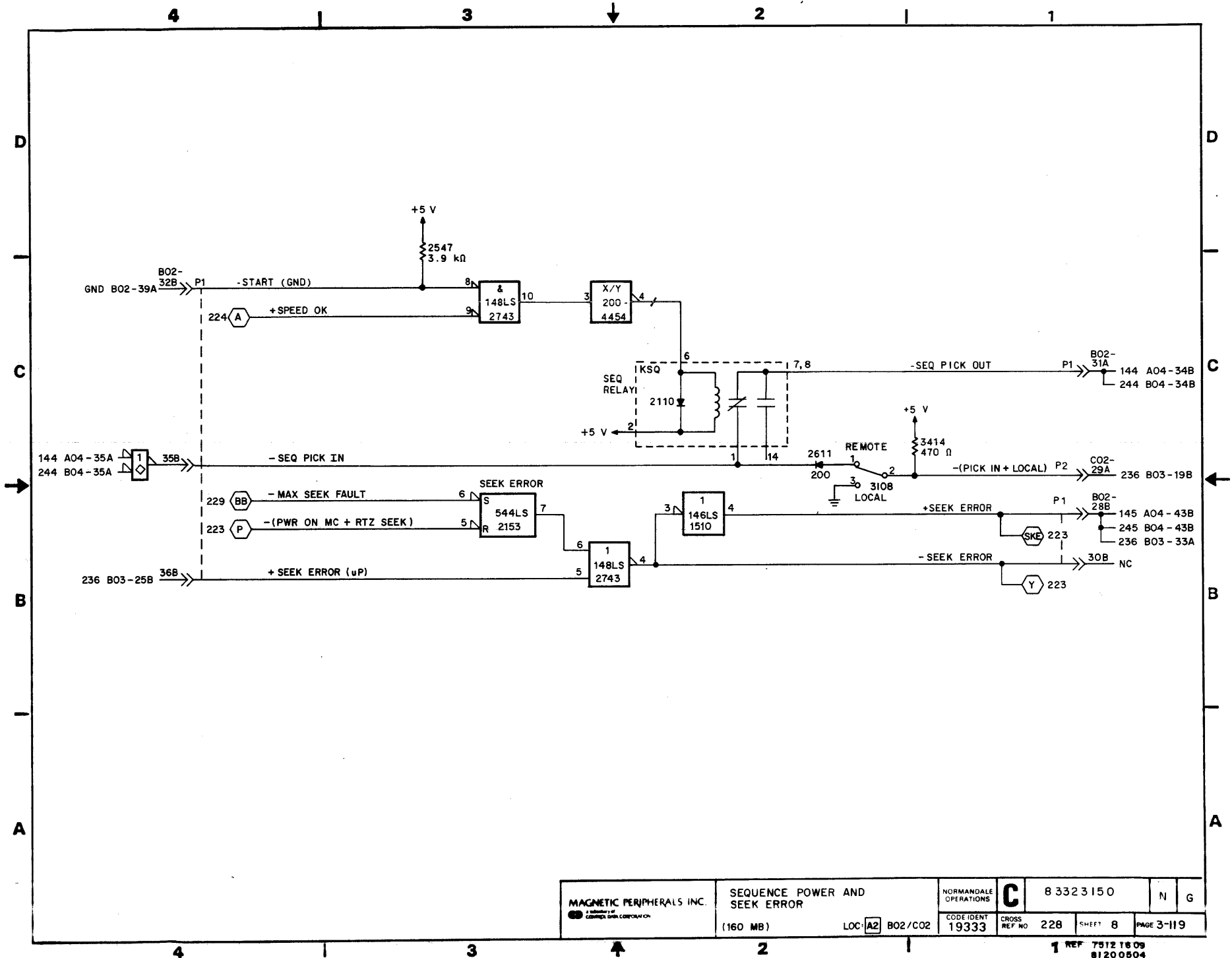
APPLICABLE ONLY TO UNITS WITH LONG LAST SECTOR.

CONTROL DATA		SECTOR COUNTER		CODE IDENT	19333	C	83323150	N	G
NORMANDE	DIVISION	(160 MB)	LDC	A2	B02/C02	CROSS REF. NO.	226	SHEET	6
						PAGE	3-117		



NOTE:
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

CONTROL DATA		DEMODULATOR GATES AND WRITE PROTECTED		CODE IDENT 19333	C	8332 3150	N	E
NORMANDEALE DIVISION		(160 MB)	LOC: A2 B02/CO2	CROSS REF NO 227		SHEET 7	PAGE 3-118	
						1 REF 75121 609 81200504		



MAGNETIC PERIPHERALS INC. <small>A subsidiary of CONTROL DATA CORPORATION</small>	SEQUENCE POWER AND SEEK ERROR (160 MB)		NORMANDALE OPERATIONS	C 8 332 3150	N G
	LOC: A2 B02/CO2	CODE IDENT 19333	CROSS REF NO 228	SHEET 8	PAGE 3-119

REVISION STATUS OF SHEETS

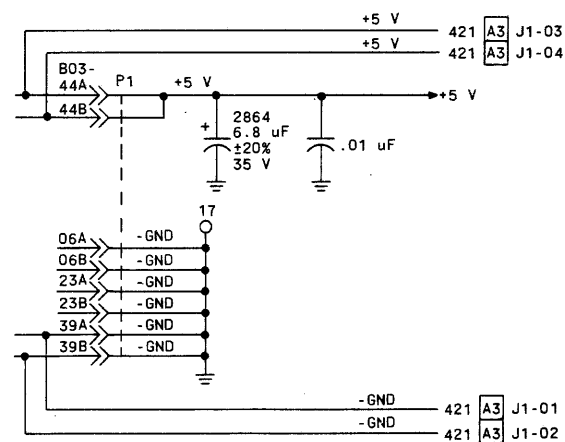
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A	A	A														
B	B	B	B	A	A	B														
C	C	C	B	A	C	C														
D	C	C	B	A	C	C														
E	C	C	B	A	C	C														
F	C	C	B	A	C	C														
G	C	C	B	A	C	G														
H	C	C	B	A	C	G														

UNUSED LOGIC ELEMENTS

ELEMENT	LOCATION	OUTPUT PIN(S)
148	0409	1, 10, 13

REVISIONS

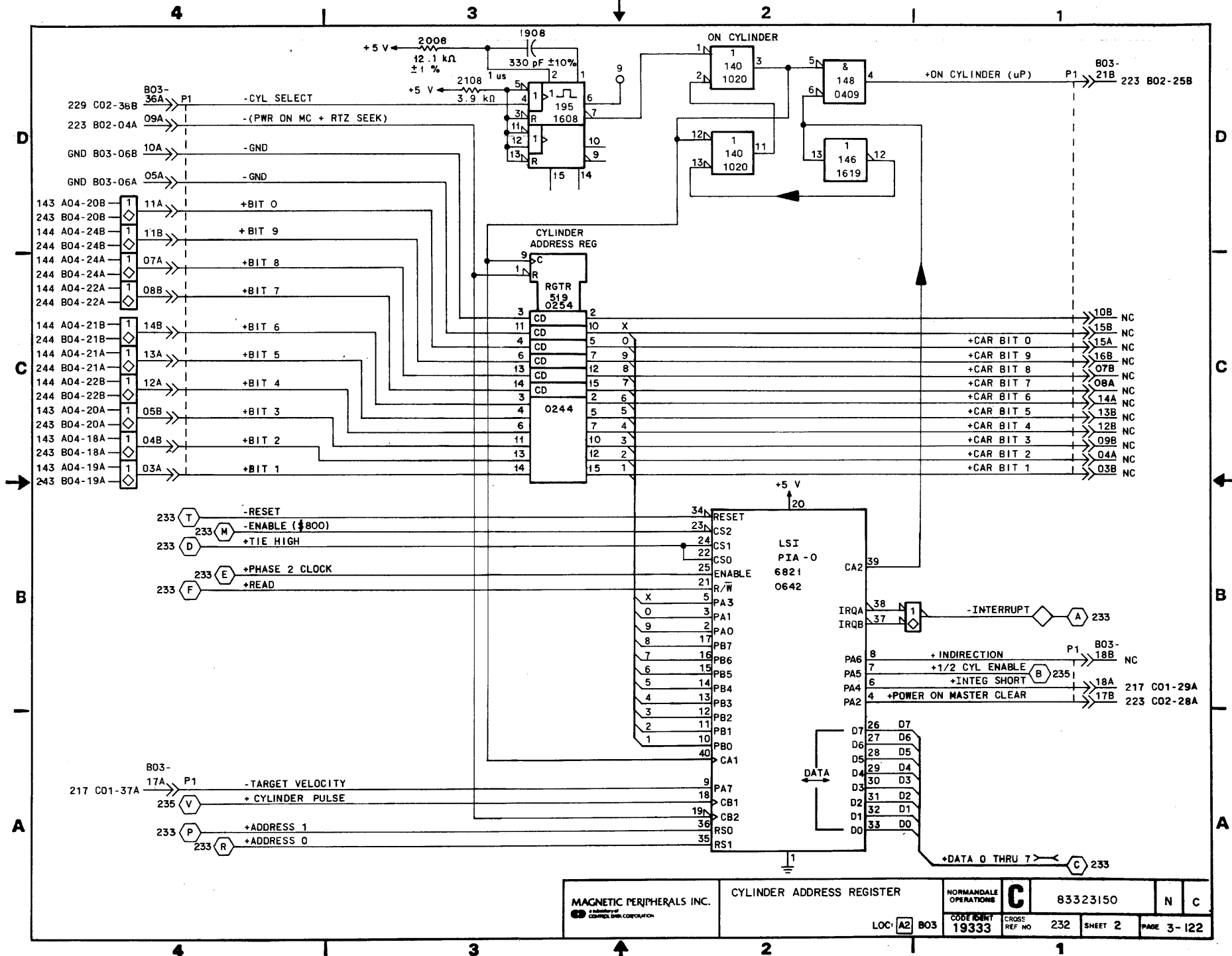
REV	ECO.	DESCRIPTION	DRFT	DATE	CHK'D
A	PE23000	RELEASED			
B	PE49146	CORRECT LOGIC DIA	TH	7-25-79	
C	PE50705	CORRECTIONS			
D	PE50659	SERVO OVERTHOOT			
E	PE50729	DESIGN IMPROVEMENT			
F	PE50630	IMPROVE ACCESS MARGINS	MF	8-15-80	
G	PE62127	ADD GND WIRE	MF	11-25-80	
H	PE62142	MJBX TO VJBX		3-18-81	

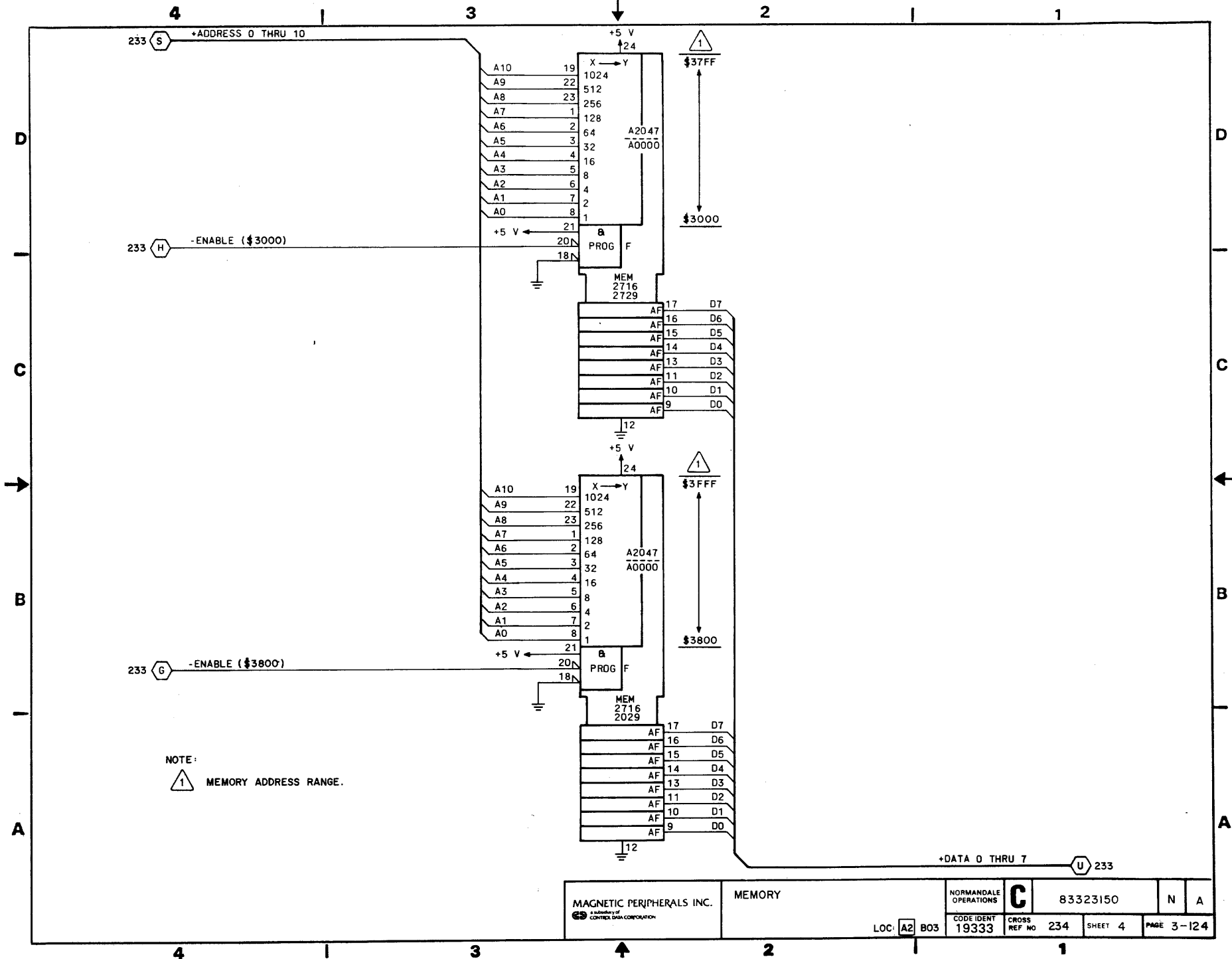


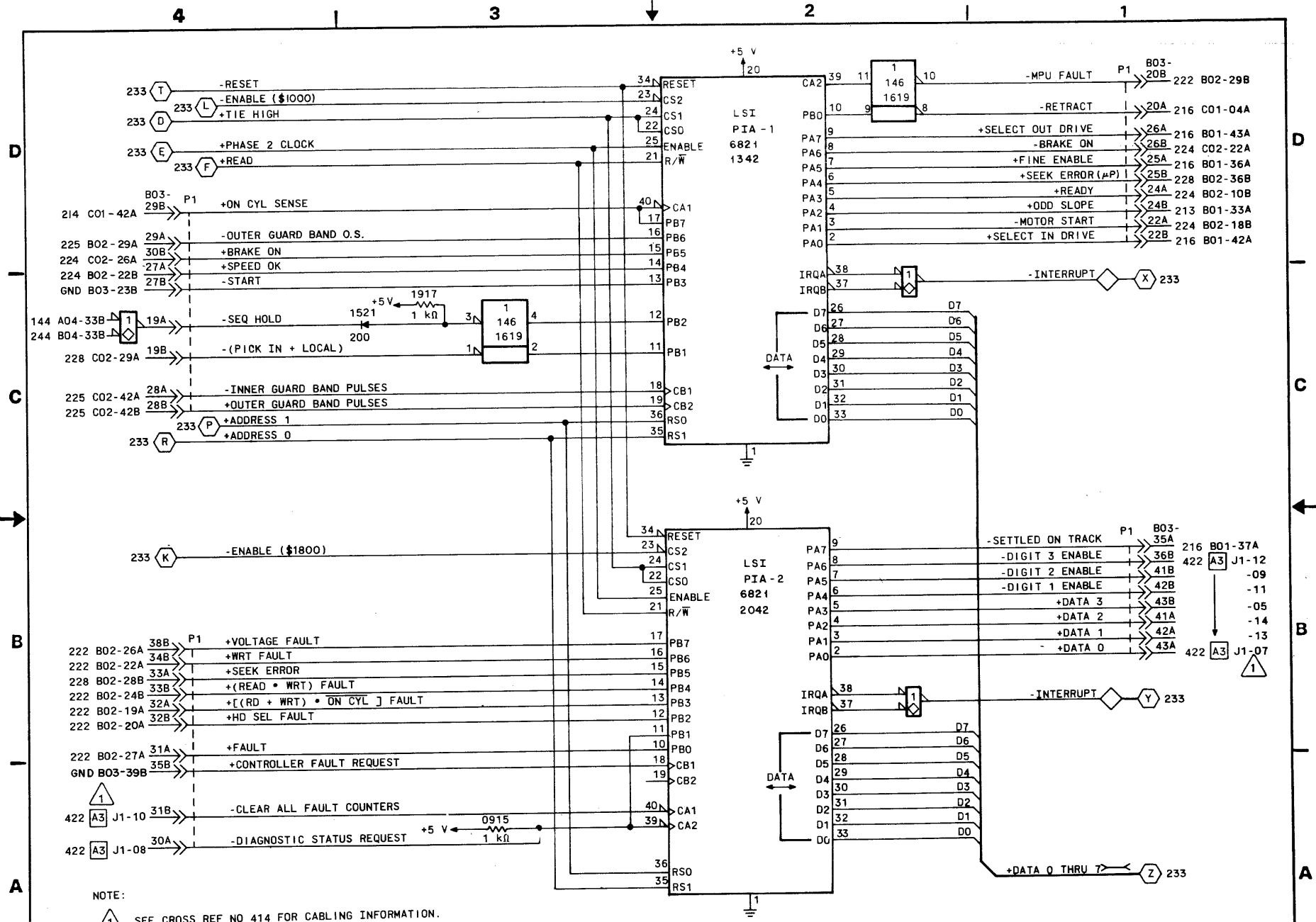
.01 uF FILTER CAPS

- +5 V
- 0309
- 0225
- 1062
- 2558
- 0820
- 1512
- 3229
- 1931
- 0529
- 1420
- 3123

DRAWN	G. KABINE	4/3/79	MAGNETIC PERIPHERALS INC. A MEMBER OF CONTROL DATA CORPORATION	MICROPROCESSOR CONTROL DIAGRAMS	NORMANDEALE OPERATIONS C	8332315C	S	H
CHECKED	S. R. Johnson	4/19/79						
ENGINEER	D. E. ...	5/1/79						
APPROVED								
TYPE: MJBX / VJBX				LOC: A2 B03	CODE IDENT 19333	CROSS REF NO 231	SHEET 1 OF 6	PAGE 3-121







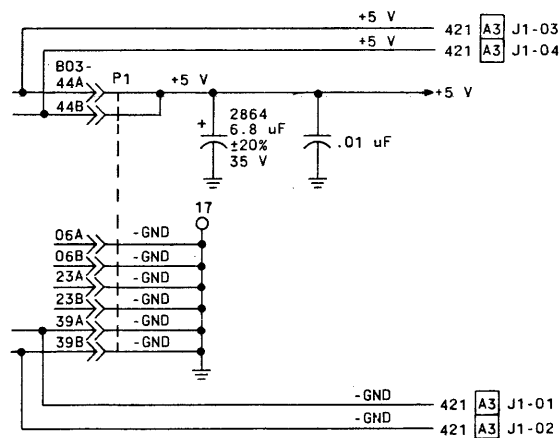
NOTE:
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

MAGNETIC PERIPHERALS INC. <small>a subsidiary of CONTROL DATA CORPORATION</small>	CONTROL AND STATUS		NORMANDE OPERATIONS	C	83323150	N	G
	LOC: A2 B03	CODE IDENT 19333	CROSS REF NO 236				

REVISION STATUS OF SHEETS																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A	A	A														
B	B	B	A	A	B															
C	B	B	A	A	B															
D	B	B	A	A	B															
E	E	B	A	E	E															
F	E	B	A	E	E															
G	E	B	A	E	E															
H	E	B	A	E	H															
J	E	B	A	E	H															
K	K	K	A	K	K															
L	K	K	A	K	K															
M	K	M	A	K	K															

REVISIONS					
REV.	ECO.	DESCRIPTION	DRFT	DATE	CHKD.
A	PE23000	RELEASED	MA	6-29-79	MA
B	PE49146	CORRECT LOGIC DIA	MA	9-10-79	MA
C	PE50630	ONE TRACK SEEK	MA	12-7-79	MA
D	PE50659	SERVO OVERSHOOT	MA	12-7-79	MA
E	PE50705	CORRECT LD	MA	12-7-79	MA
F	PE50729	EPROM CHG	MA	1-28-80	MA
G	PE62112	JJBX TO RJBX	TH	10-28-80	TH
H	PE62127	ADD GND WIRE	TH	11-18-80	TH
J	PE62142	MJBX TO VJBX	MF	12-18-80	MF
K	PE62224	VJBX → ZJBX AND RJBX TO YJBX	MF	2-12-81	MF
L	PE 21000	ADD IDD STICKER	MF	7-14-81	MF
M	PE62262	CHG RES ON -JBX	MF	4-8-81	MF

UNUSED LOGIC ELEMENTS		
ELEMENT	LOCATION	OUTPUT PIN(S)
14B	0409	1



.01 uF FILTER CAPS

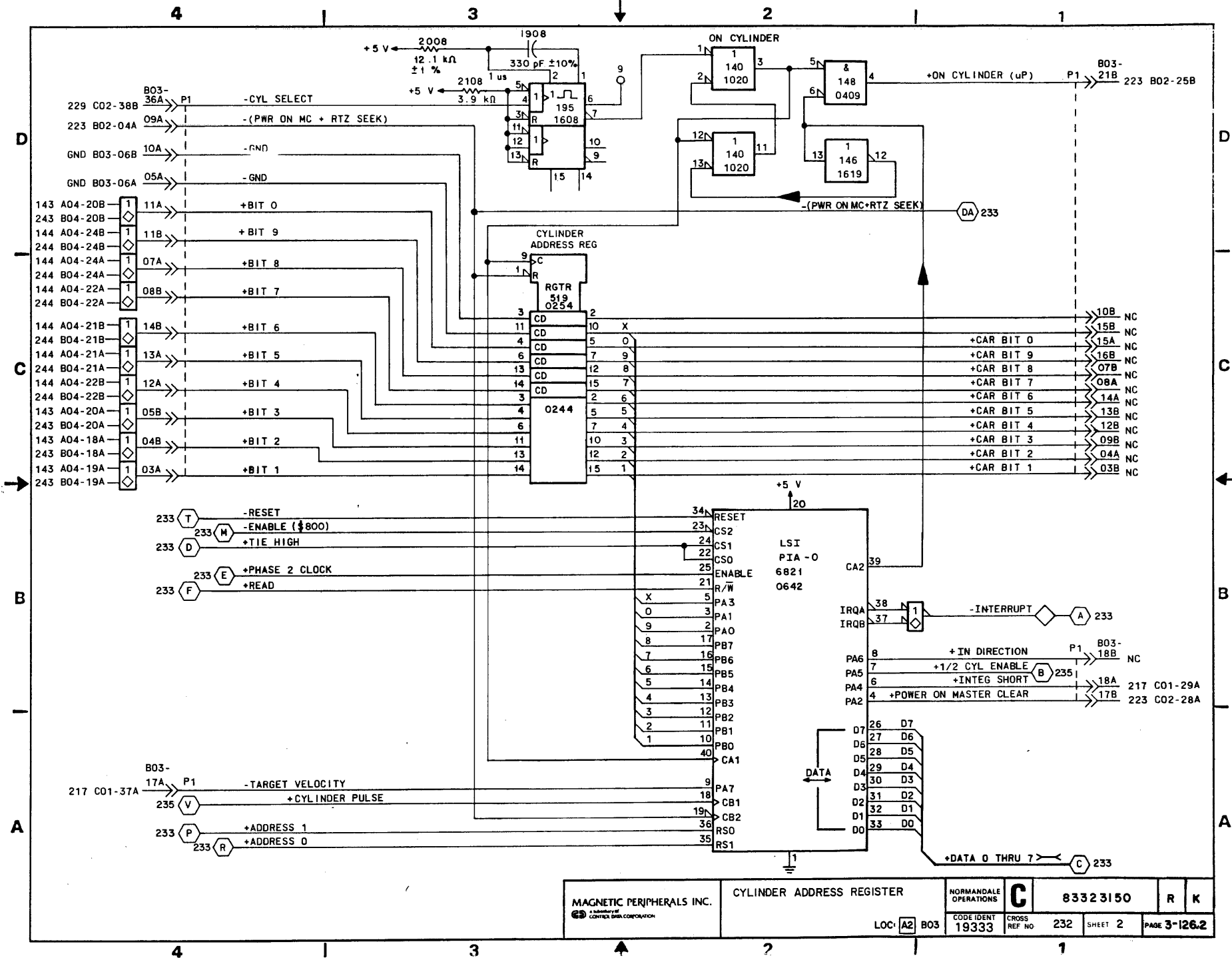
+5 V
0309
0225
1062
2558
0820
1512
3229
1931
0529
1420
3123

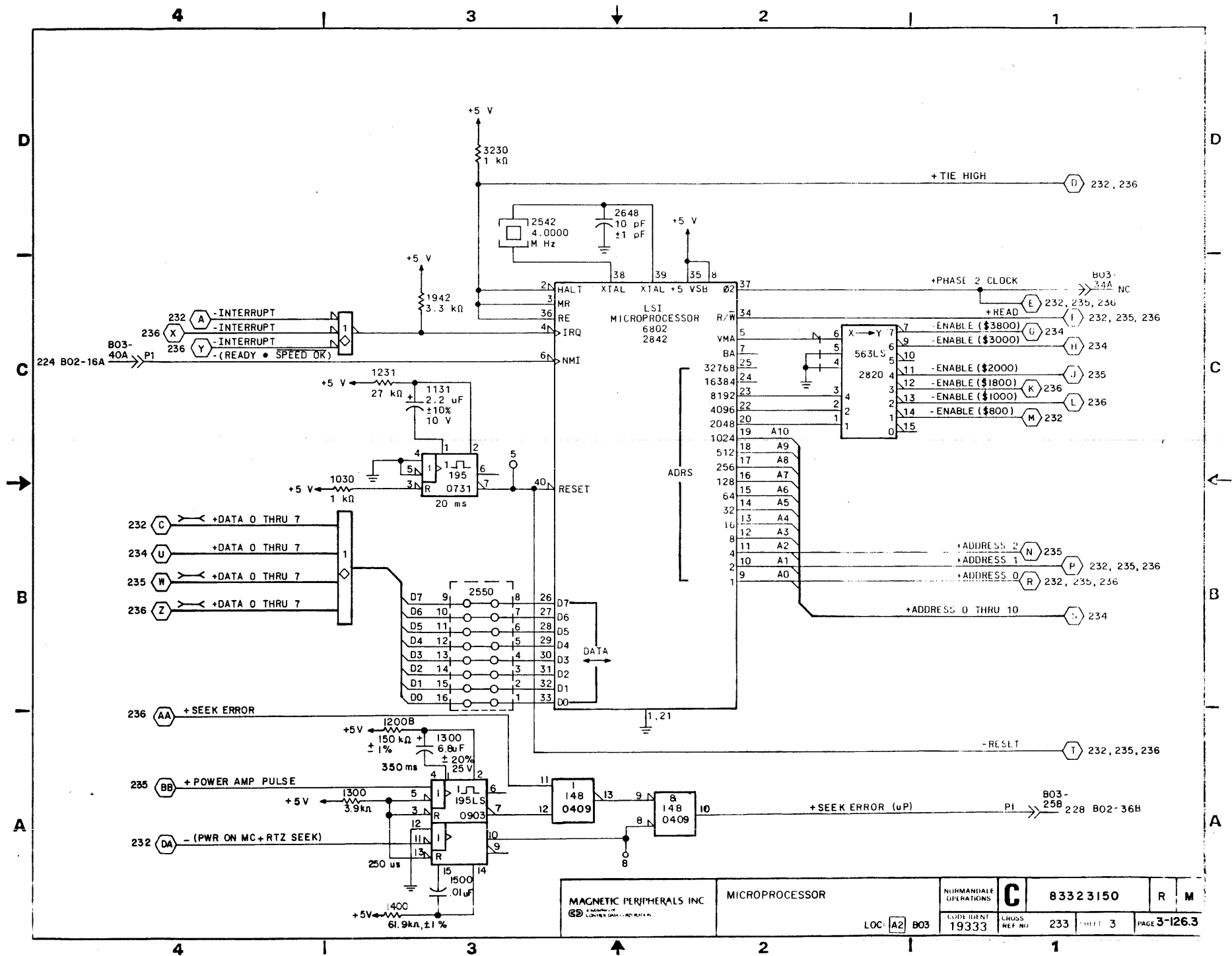
DRAWN	G. RABINE	4/3/79
CHECKED	S. K. Johnson	4/11/79
ENGINEER	D. F. ...	5/8/79
APPROVED		

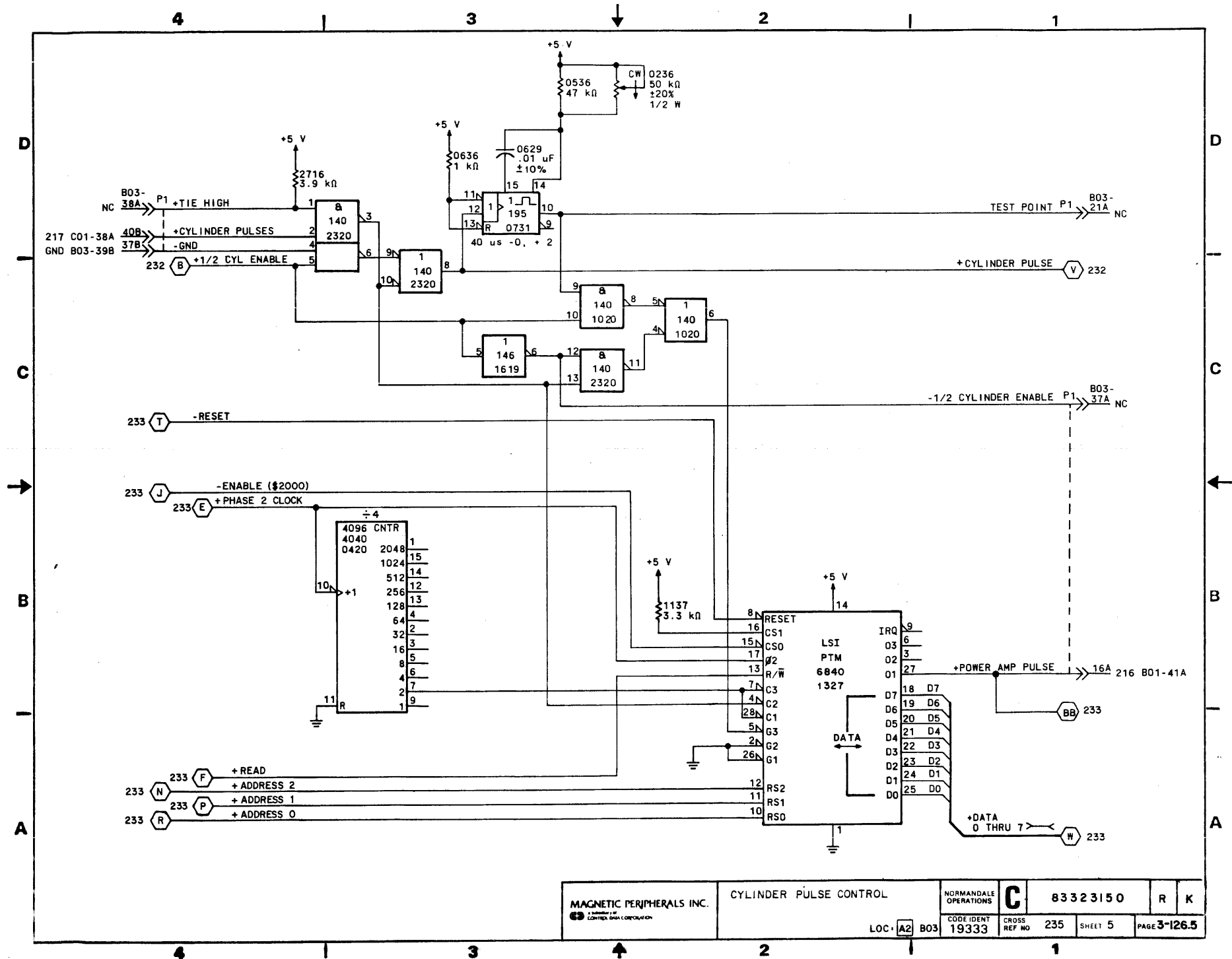
MAGNETIC PERIPHERALS INC.
A DIVISION OF
CENTRA DATA CORPORATION

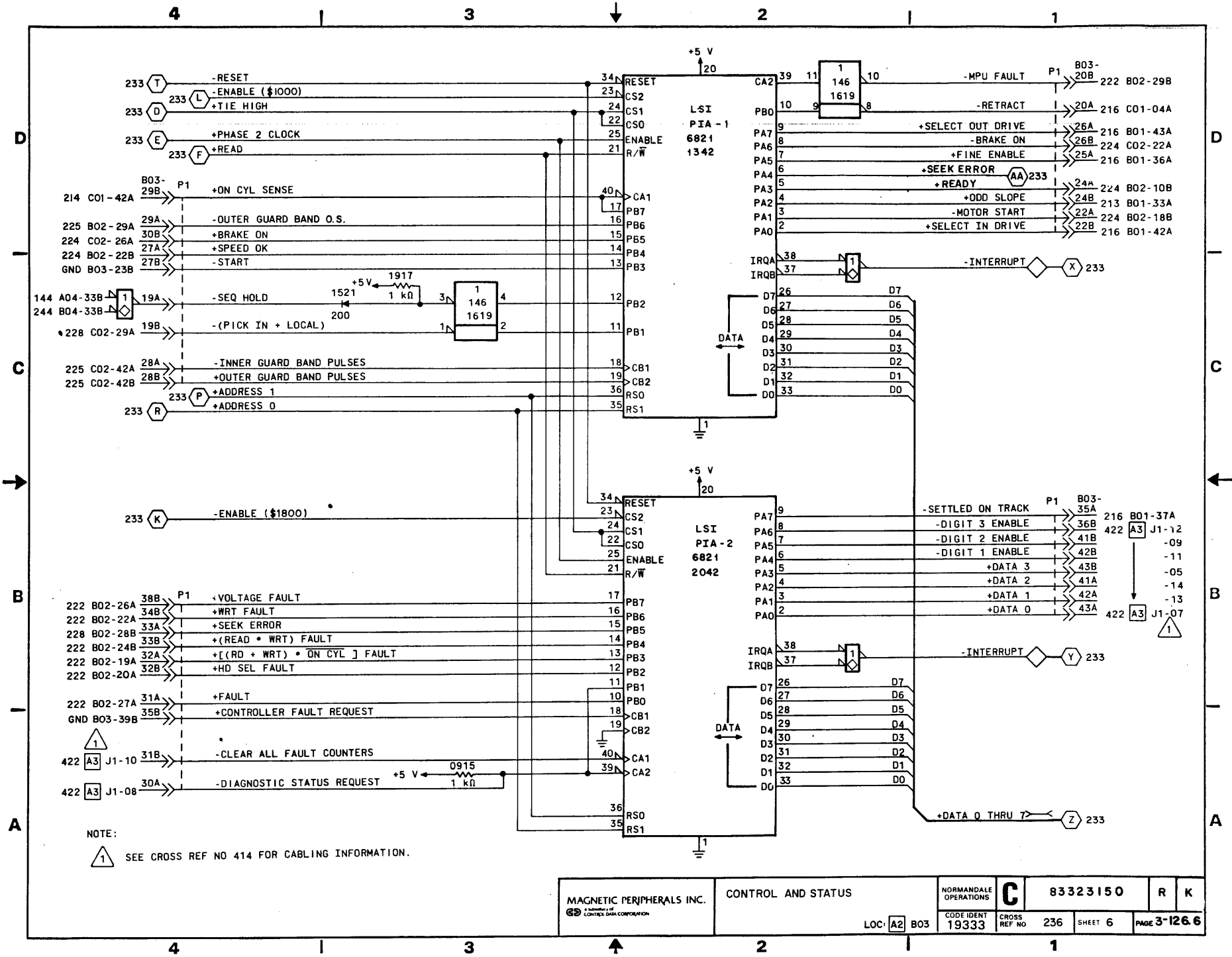
MICROPROCESSOR CONTROL
DIAGRAMS

NUMERICAL OPERATIONS	C	83323150	R	M
CODE IDENT	19333	CROSS REF NO.	231	SHEET
			1	OF 6
				PAGE
				3-126.1







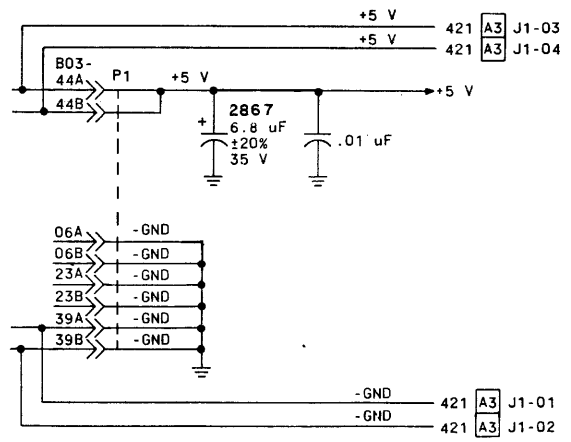


NOTE:
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

REVISION STATUS OF SHEETS																			
I	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A	A														
B	B	B	A	A	B														
C	B	B	A	A	B														
D	B	B	A	A	B														
E	E	B	A	E	E														
F	E	B	A	E	E														
G	E	B	A	E	E														
H	E	B	A	E	H														
J	E	B	A	E	H														
K	K	K	A	K	K														
L	K	K	A	K	K														
M	K	M	A	K	K														
N	N	N	N	N	N														
P	N	N	N	N	N														

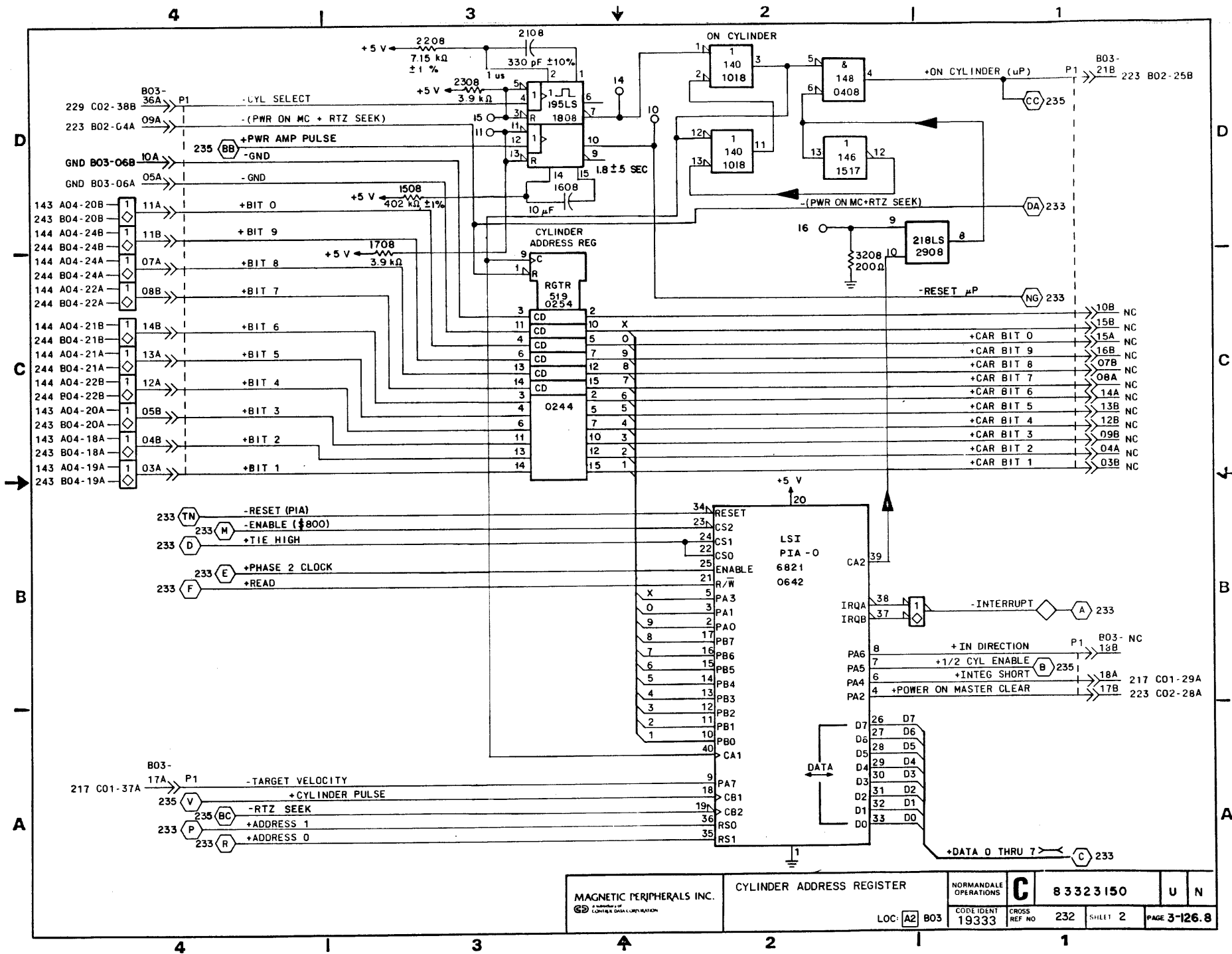
UNUSED LOGIC ELEMENTS		
ELEMENT	LOCATION	OUTPUT PIN(S)
140	2918	6
201LS	2118	8,11
175LS	2408	8,9

REVISIONS					
REV	ECO	DESCRIPTION	DATE	BY	CHK'D
A	PE23000	RELEASED			
B	PE49146	CORRECT LOGIC DIA	9-12-79	MA	
C	PE50630	ONE TRACK SEEK	12-7-79	MA	
D	PE50659	SERVO OVERTHOOT	12-7-79	MA	
E	PE50705	CORRECT LD	12-7-79	MA	
F	PE50729	EPROM CHG	1-28-80	MA	
G	PE62112	JJBX TO RJBX	10-28-80	TH	
H	PE62127	ADD GND WIRE	11-18-80	TH	
J	PE62142	MJBX TO VJBX	12-18-80	MF	
K	PE62224	VJBX → ZJBX	2-12-81	MF	
L	PE21000	ADD ODD STICKER	1-5-82	MF	
M	PE62262	CHG RES ON -JBX	4-8-81	MF	
N	DJO2085	CARD CHGS TO ADJBX/AEJBX	8-12-81	MF	
P	DJO2213	CHANGE CAPACITOR LOCATION	1-5-82	MJ	

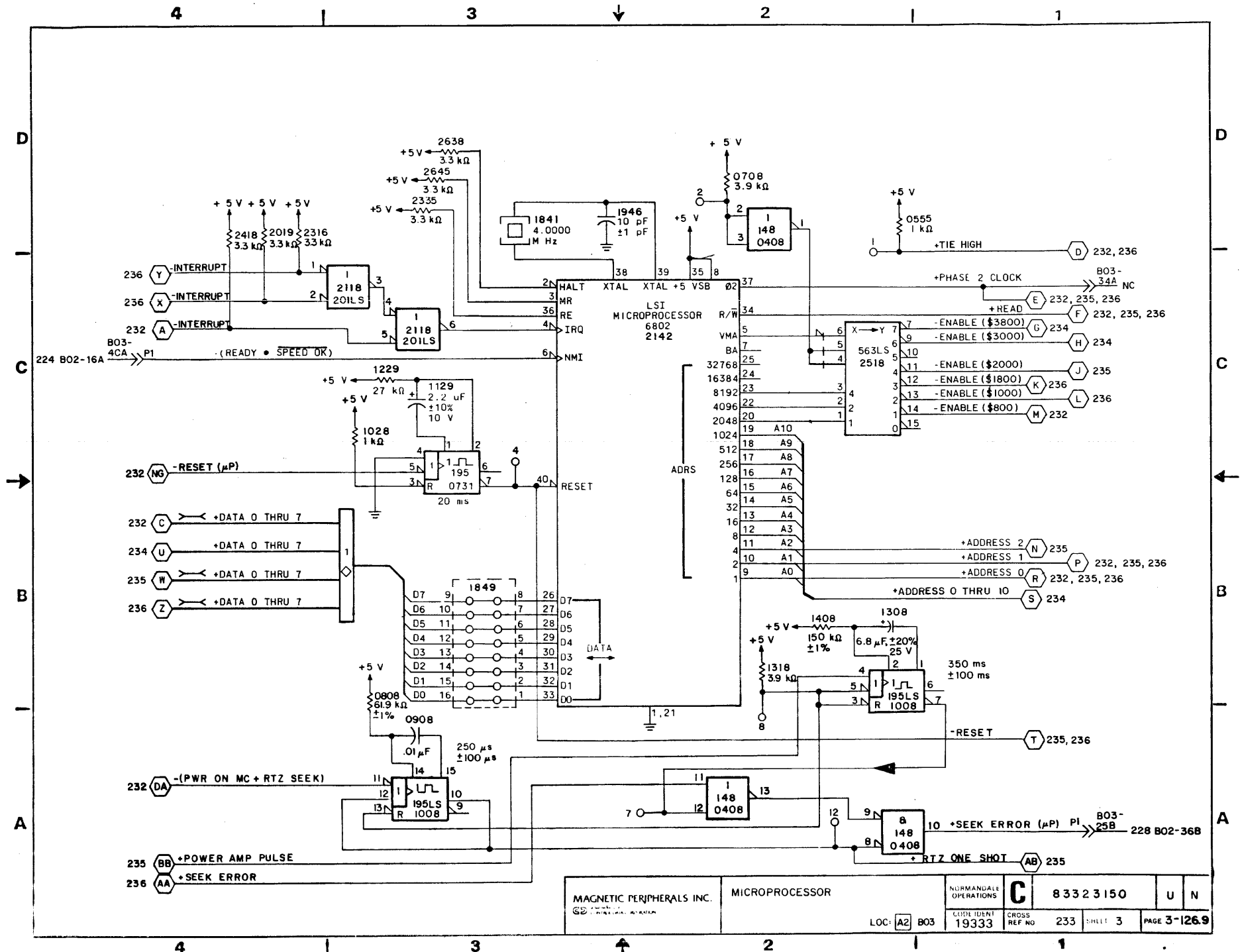


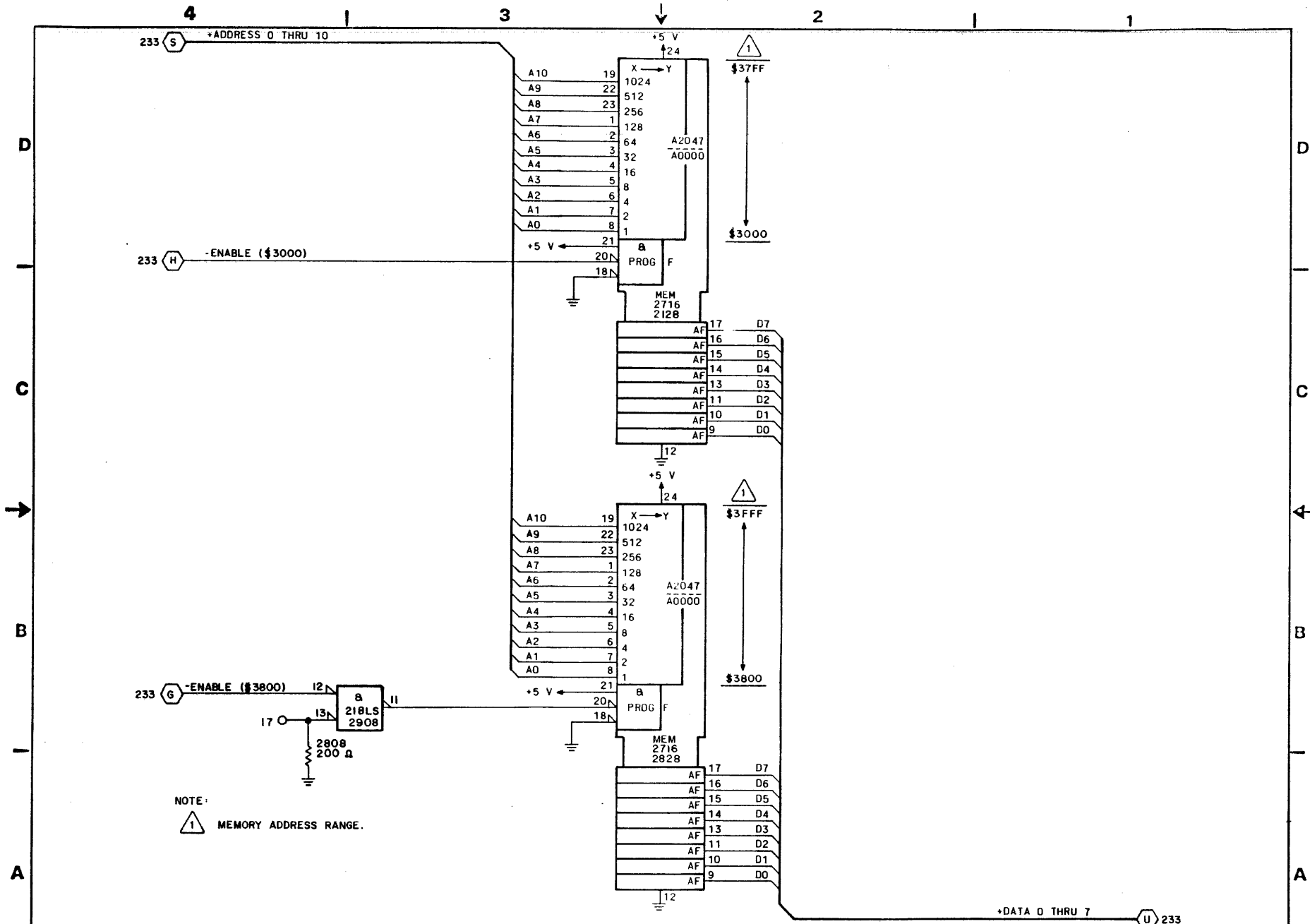
- .01 uF FILTER CAPS
- +5 V
 - 0141
 - 0308
 - 0628
 - 0718
 - 0818
 - 1158
 - 1418
 - 1834
 - 2057
 - 2126
 - 2140
 - 2826
 - 3218

DRAWN: R. K. JOHNSON 4/3/79 CHECKED: R. K. JOHNSON 9/19/79 ENGINEER: J. G. JOHNSON 5/4/79 APPROVED:	MAGNETIC PERIPHERALS INC. <small>A DIVISION OF CONTROL DATA CORPORATION</small>	MICROPROCESSOR CONTROL DIAGRAMS TYPE: AD/AEJBX LOC: A2 B03	NORMANVILLE OPERATIONS C 83323150 U P 19333 231 1 of 6 3-126.7
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MAGNETIC PERIPHERALS INC. <small>A DIVISION OF GE CORP. DATA CORPORATION</small>	CYLINDER ADDRESS REGISTER		NORMANDAILE OPERATIONS	C	8 3 3 2 3 1 5 0	U	N
	LOC: A2 B03	CODE IDENT 19333	CROSS REF NO 232				





MAGNETIC PERIPHERALS INC. A Division of LITTON ELECTRONIC CORPORATION	MEMORY	NORMANDEALE OPERATIONS	C	83323150	U	N
		CODE IDENT 19333	CROSS-REF NO 234	SHEET 4	PAGE 3-126.10	

LOC: **A2** 803

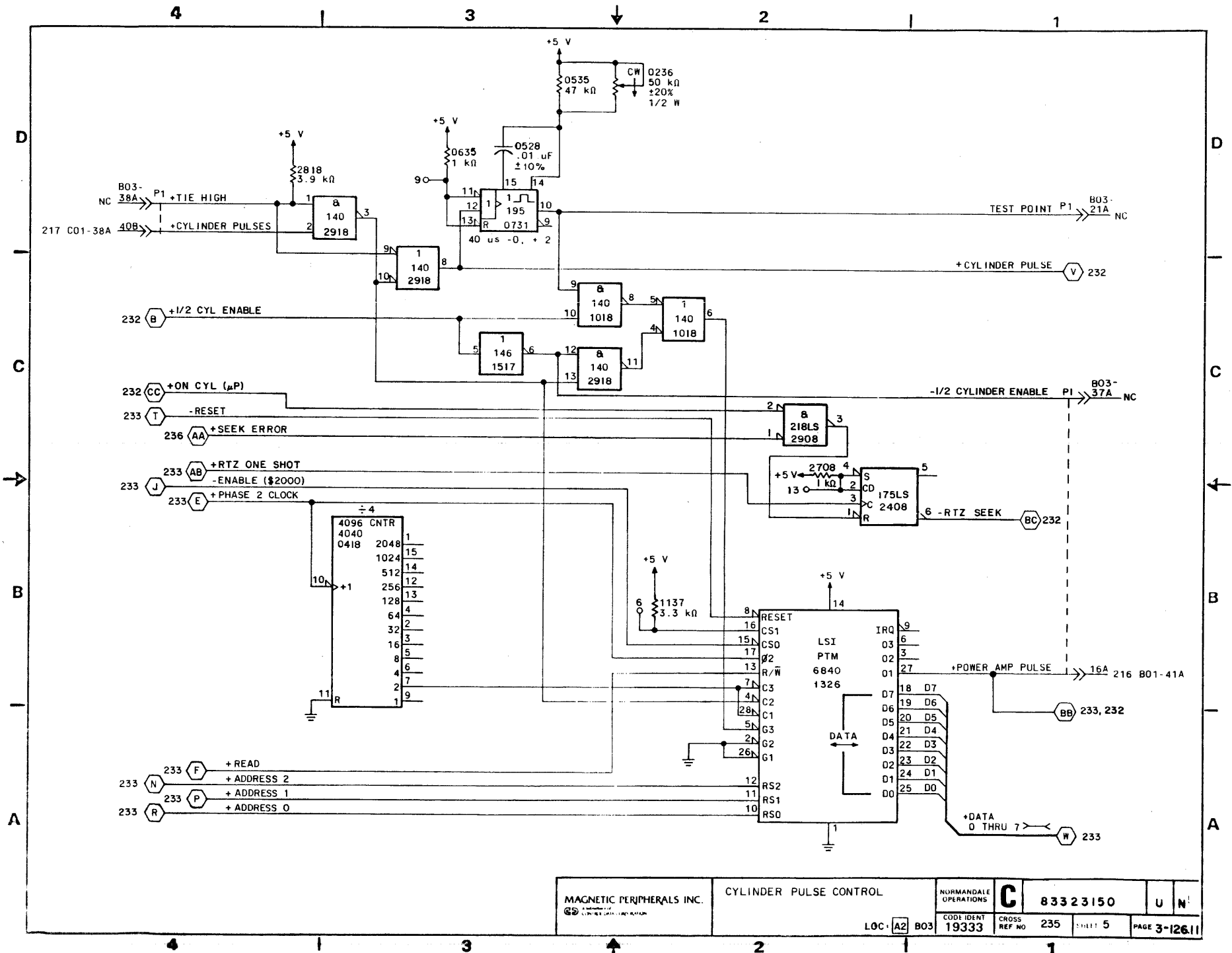
233

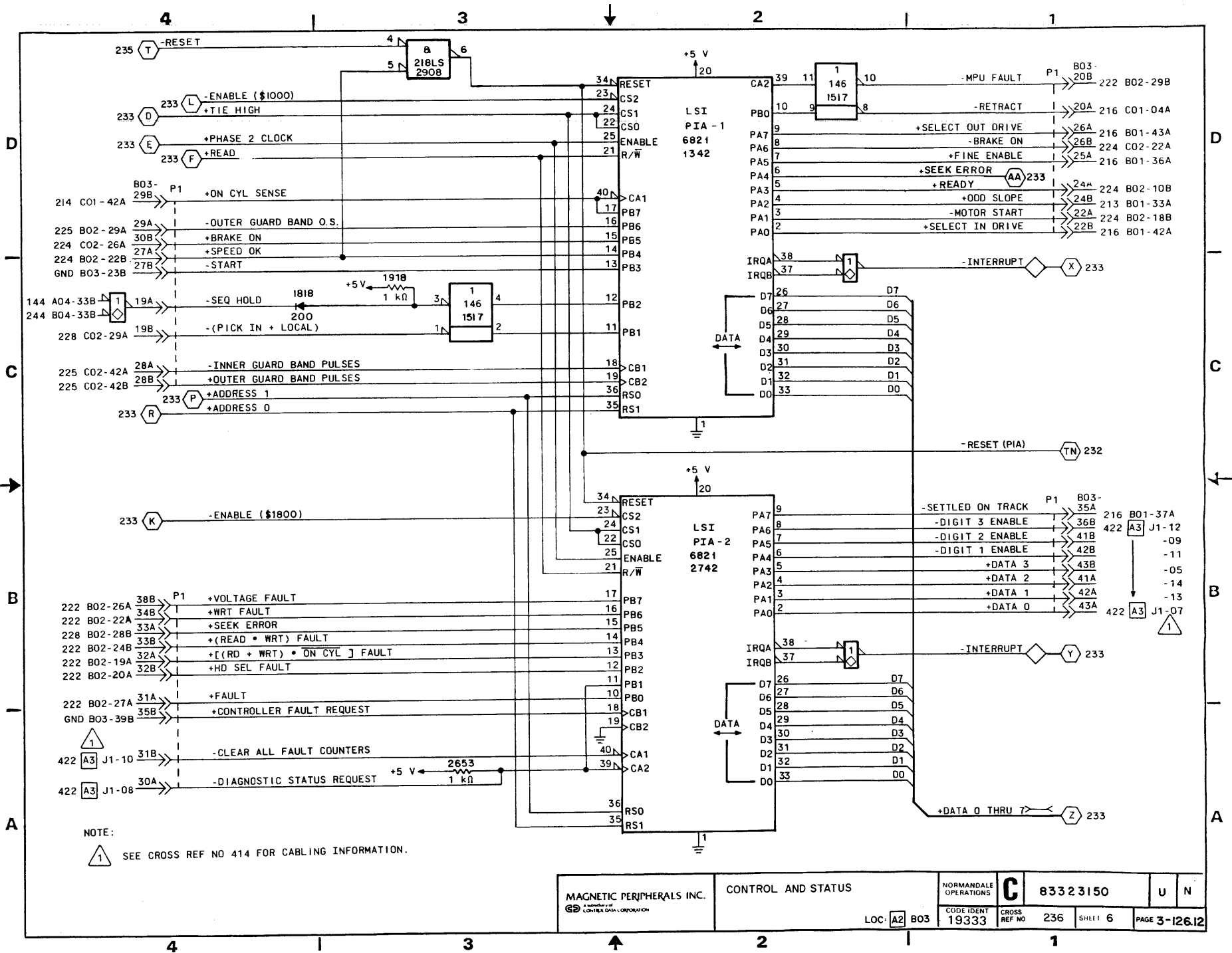
D
C
B
A

D
C
B
A

4 | 1 | 3 | 2 | 1

4 | 1 | 3 | 2 | 1





REVISION STATUS OF SHEETS																				
I	2	3	4	5	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A	A	A														
B	B	A	A	A	A	A														
C	C	A	A	A	A	A														

REVISIONS					
REV.	ECO.	DESCRIPTION	DRFT.	DATE	CHK'D
A	PE23000	RELEASED			
B	PE42238	CHANGE I.C. FAMILIES	MF	8-13-80	
C	DJ02075	CHANGE IC	MF	1-6-82	

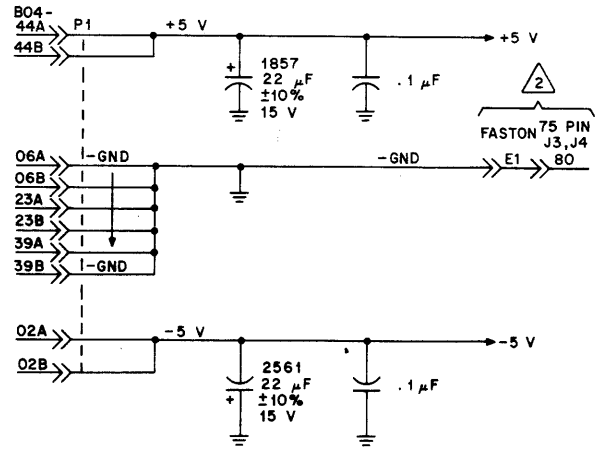
UNUSED RESISTOR PACKS

LOCATION	PINS
0264	4,7
1014	4,7,8
1026	6
1044	5,7,8
1054	3,7,8

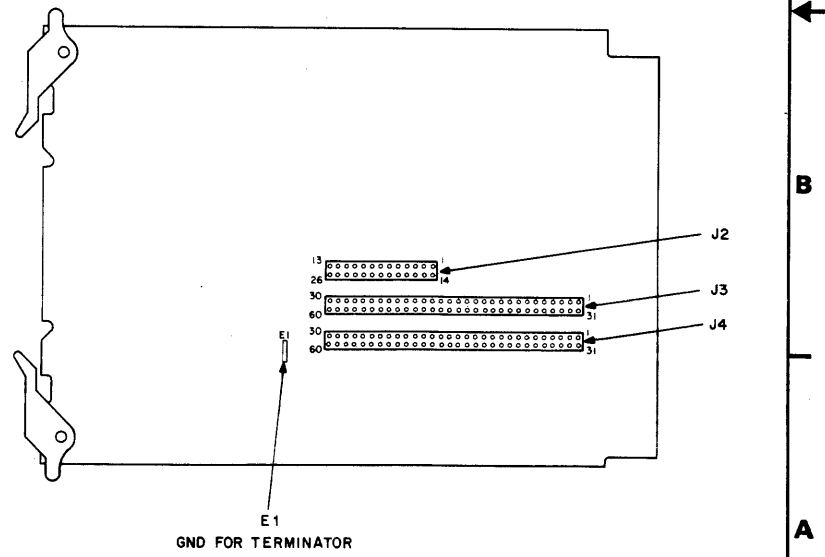
UNUSED LOGIC ELEMENTS

ELEMENT	LOCATION	OUTPUT PIN(S)
175LS	0228	5,6

- NOTES:
- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
 - 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

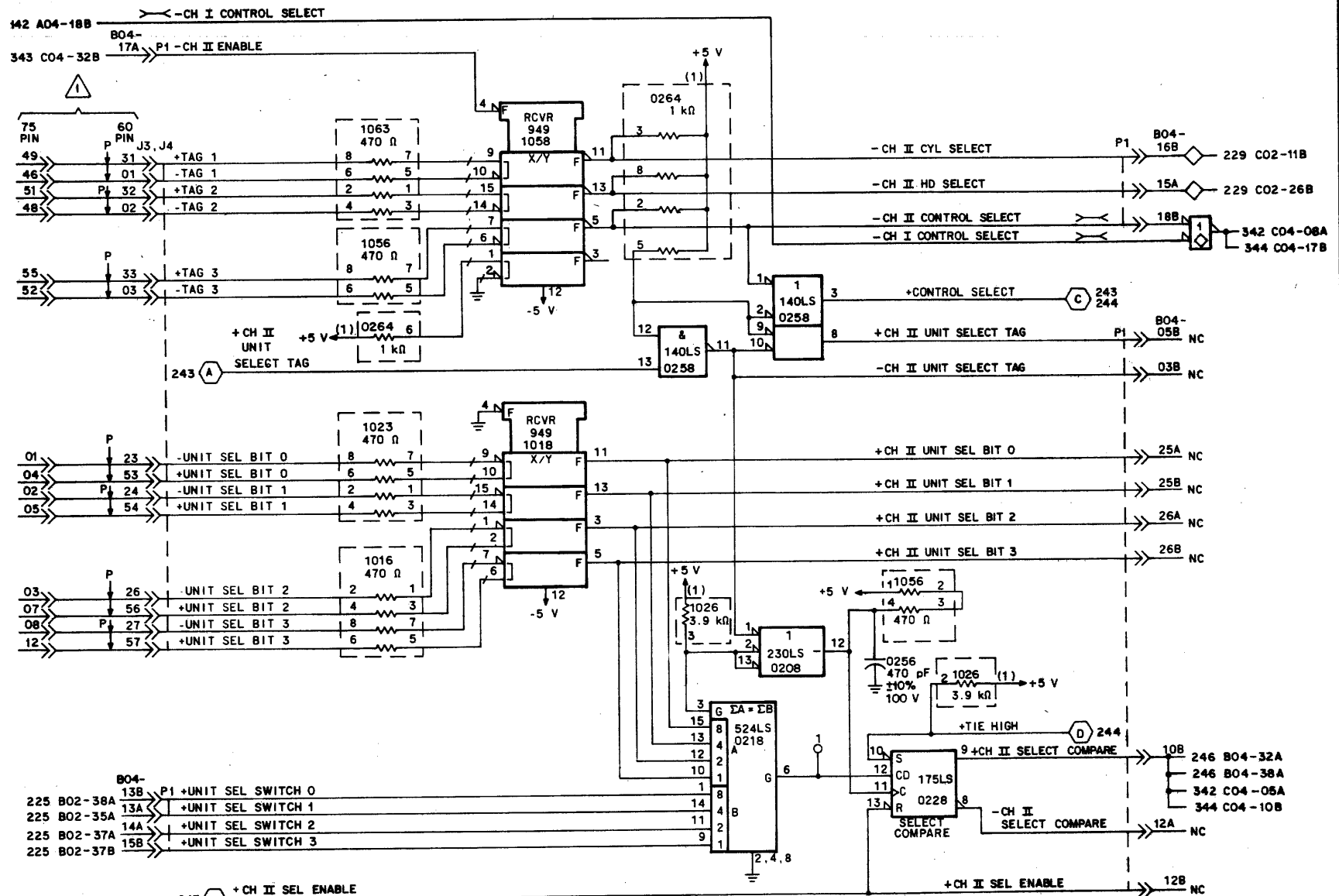


.1 µF FILTER CAPS	
+5 V	-5 V
0214	1012
0226	1122
0235	1032
0245	1042
0255	1147
1015	1262
1025	2812
1035	2822
1145	2830
1155	2837
2814	2845
2823	2855
2831	
2838	
2846	
2854	



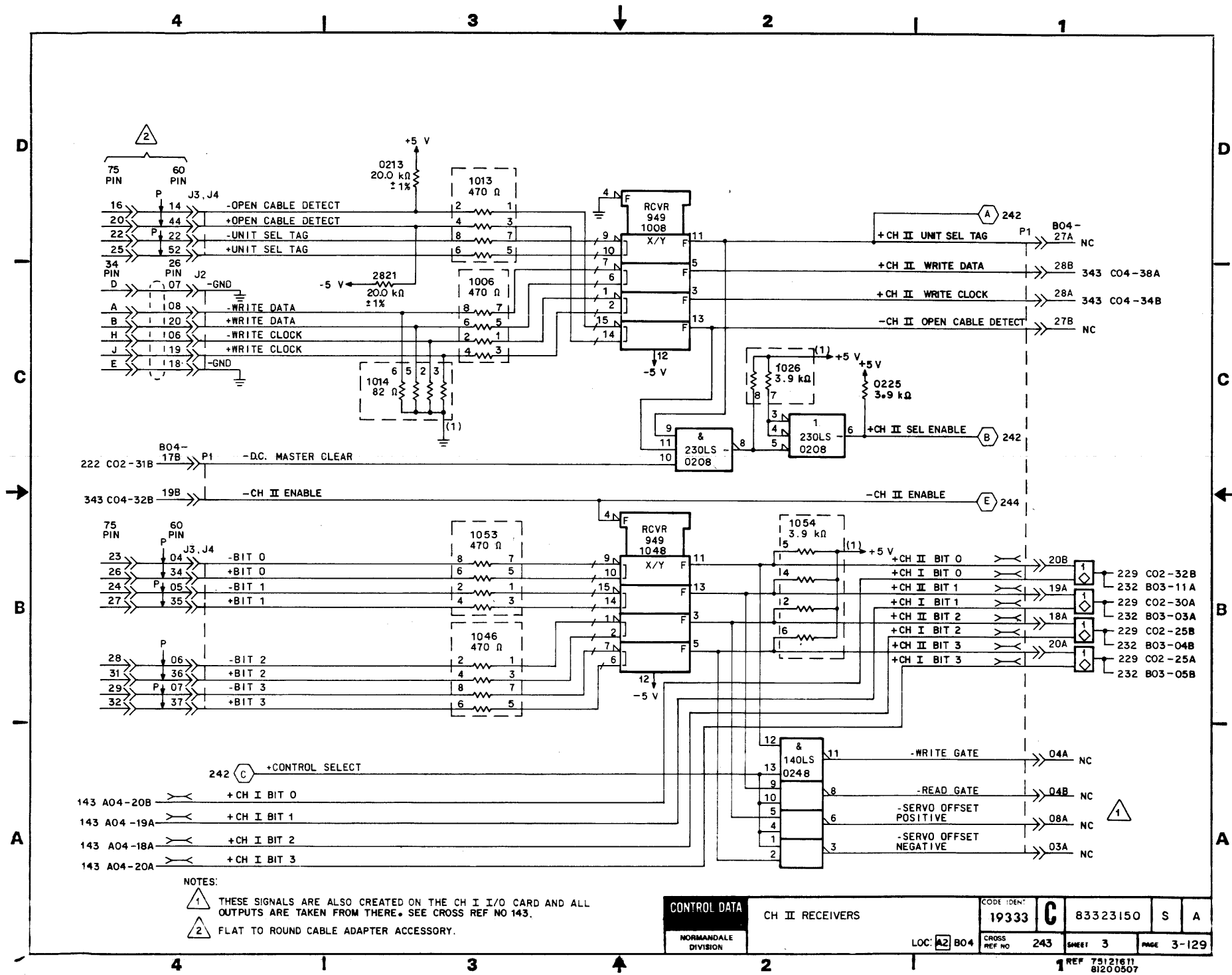
APPLICABLE ONLY TO DUAL CHANNEL UNITS.

DRAWN	<i>J. Rabine</i>	CONTROL DATA	CODE IDENT	19333	C	83323150	U	C
CHECKED			CROSS REF	241	SHEET	1 of 6	PAGE	3-127
ENGINEER		NORMAN DALE DIVISION	TYPE	CFAX	LOC	A2 B04		
APPROVED								



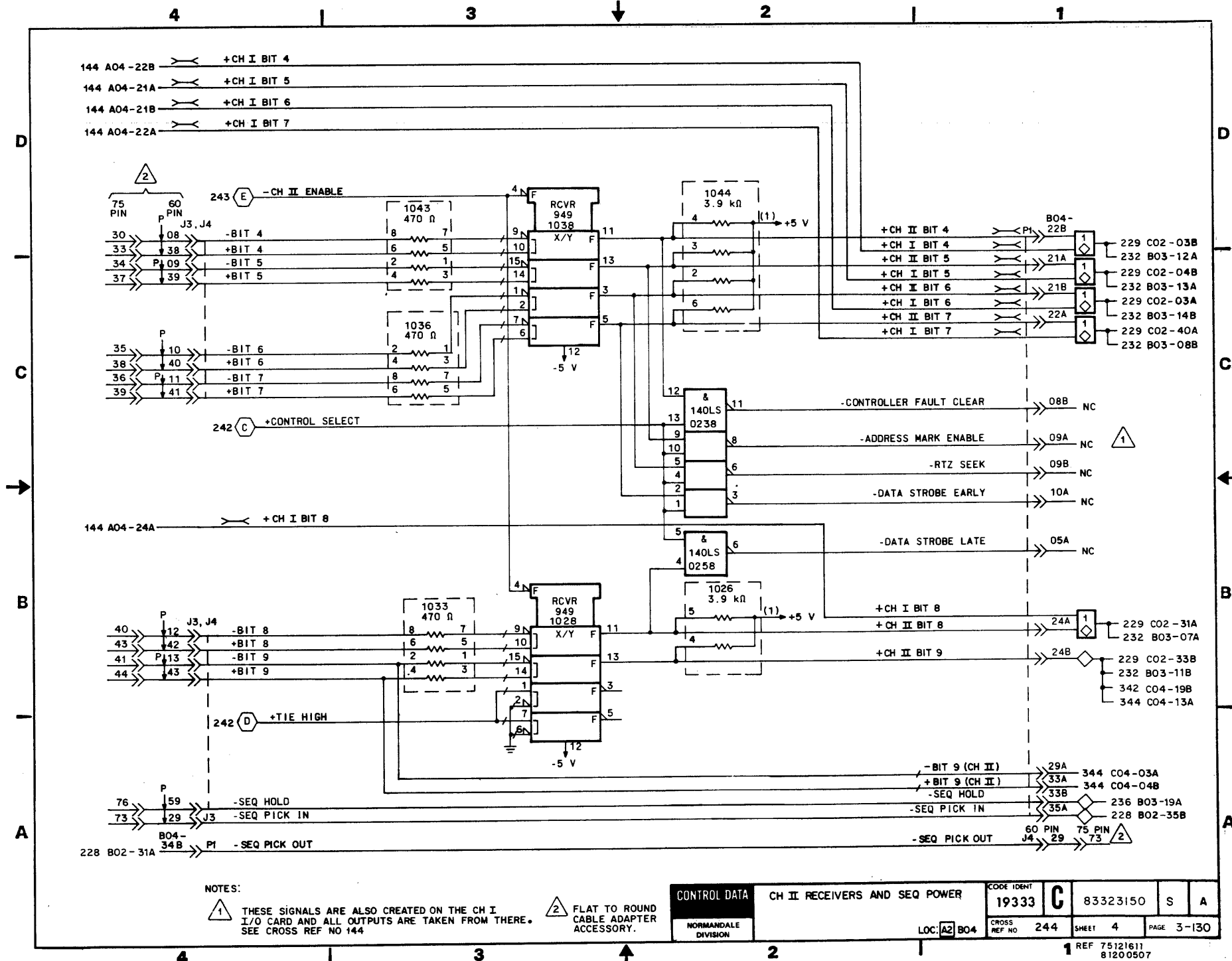
NOTE: ⚠ FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA		CH II RECEIVERS AND UNIT SELECT		CODE IDENT 19333 C	83323150	U	C
NORMANDEALE DIVISION		LOC: A2 B04	CROSS REF NO 242	SHEET 2	PAGE 3-128		
				REF 75121611		81200507	



NOTES:
 1 THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 143.
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA	CH II RECEIVERS		CODE IDENT	19333	C	83323150	S	A
	NORMANDEALE DIVISION		CROSS REF NO	243	SHEET	3	PAGE	3-129
LOC: A2 B04			1 REF 79121611 8120097					

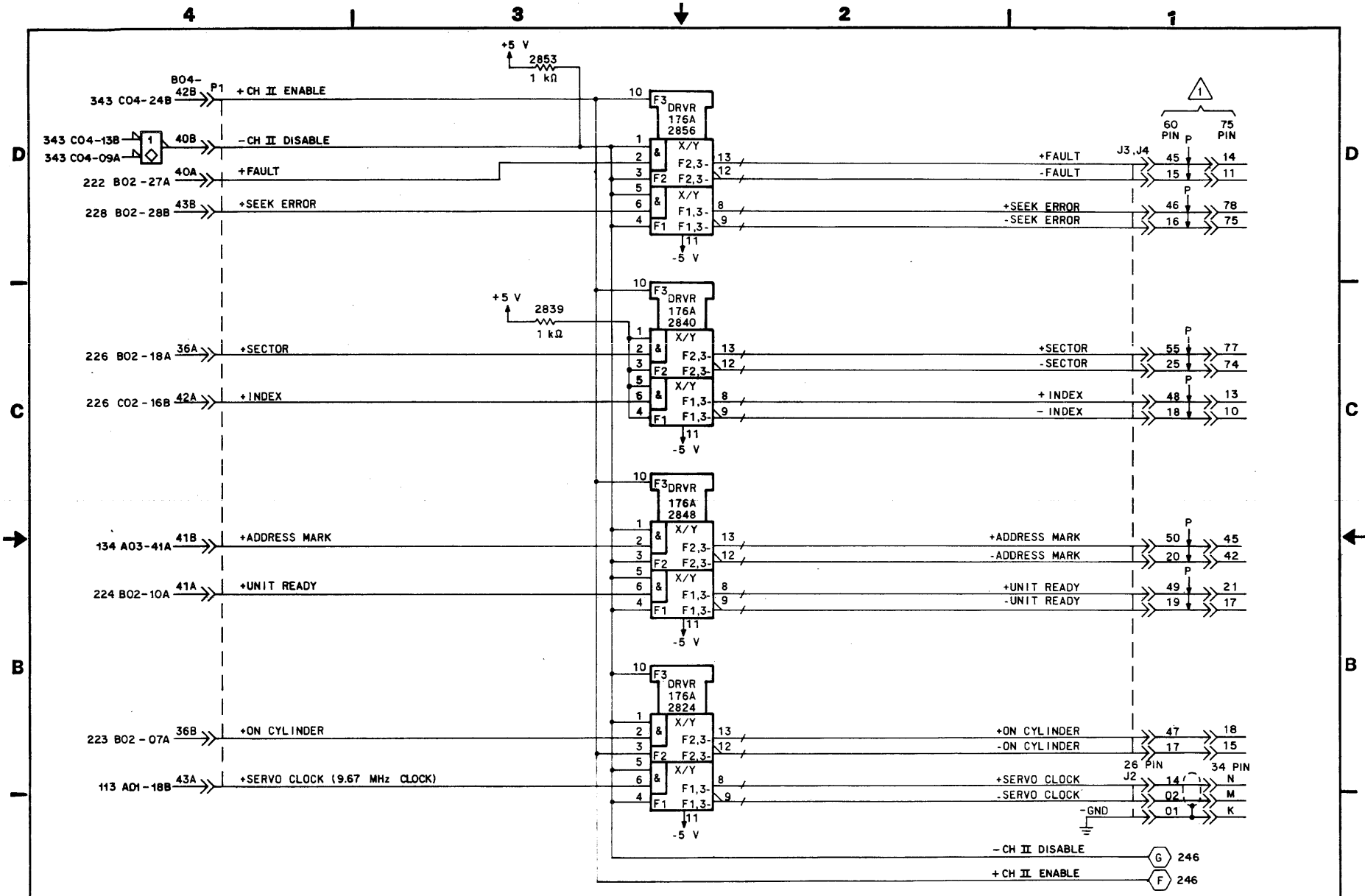



NOTES:

1 THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 144

2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

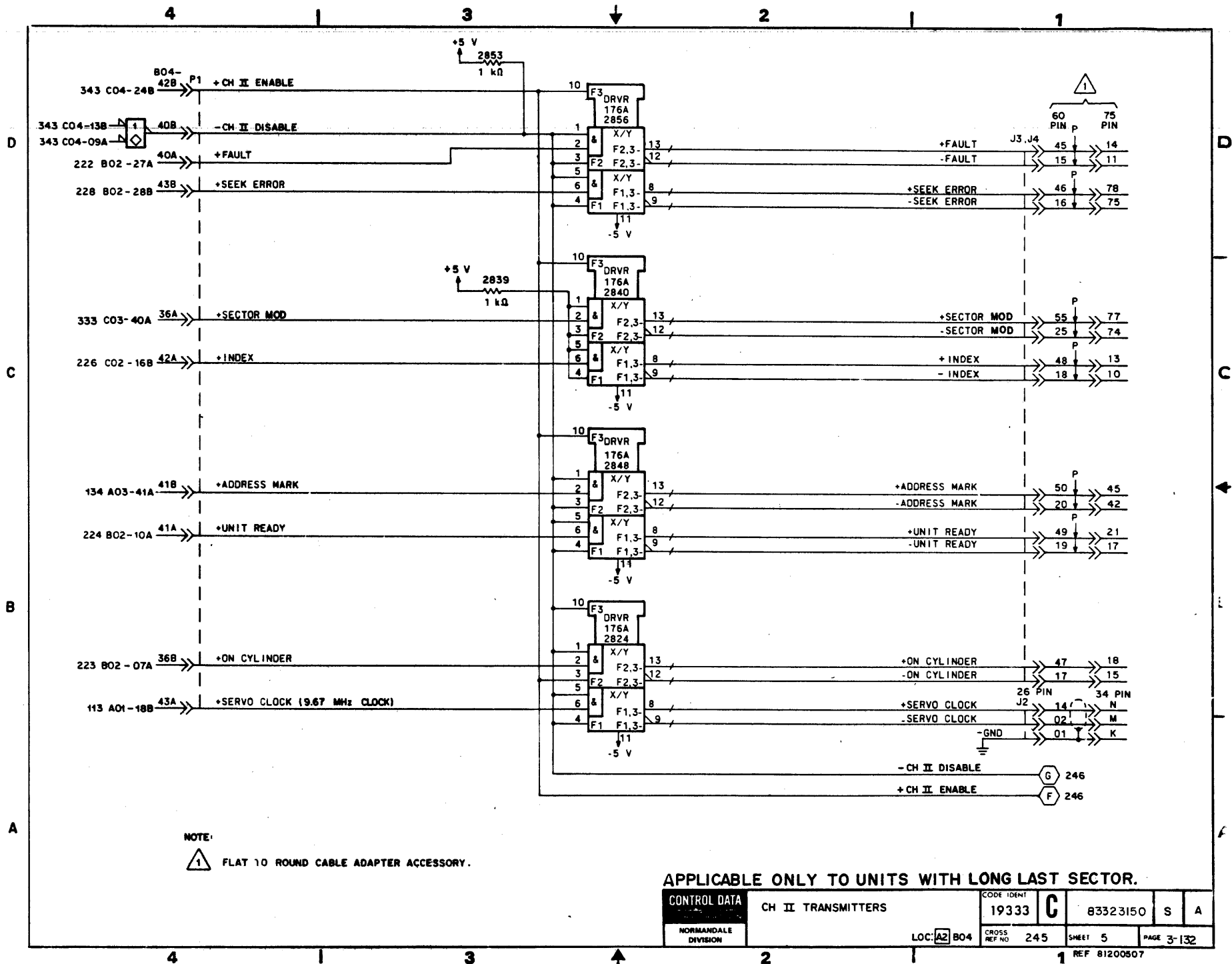
CONTROL DATA	CH II RECEIVERS AND SEQ POWER		CODE IDENT	C	83323150	S	A
			19333				
NORMANDEALE DIVISION	LOC: A2 B04	CROSS REF NO	244	SHEET	4	PAGE	3-130

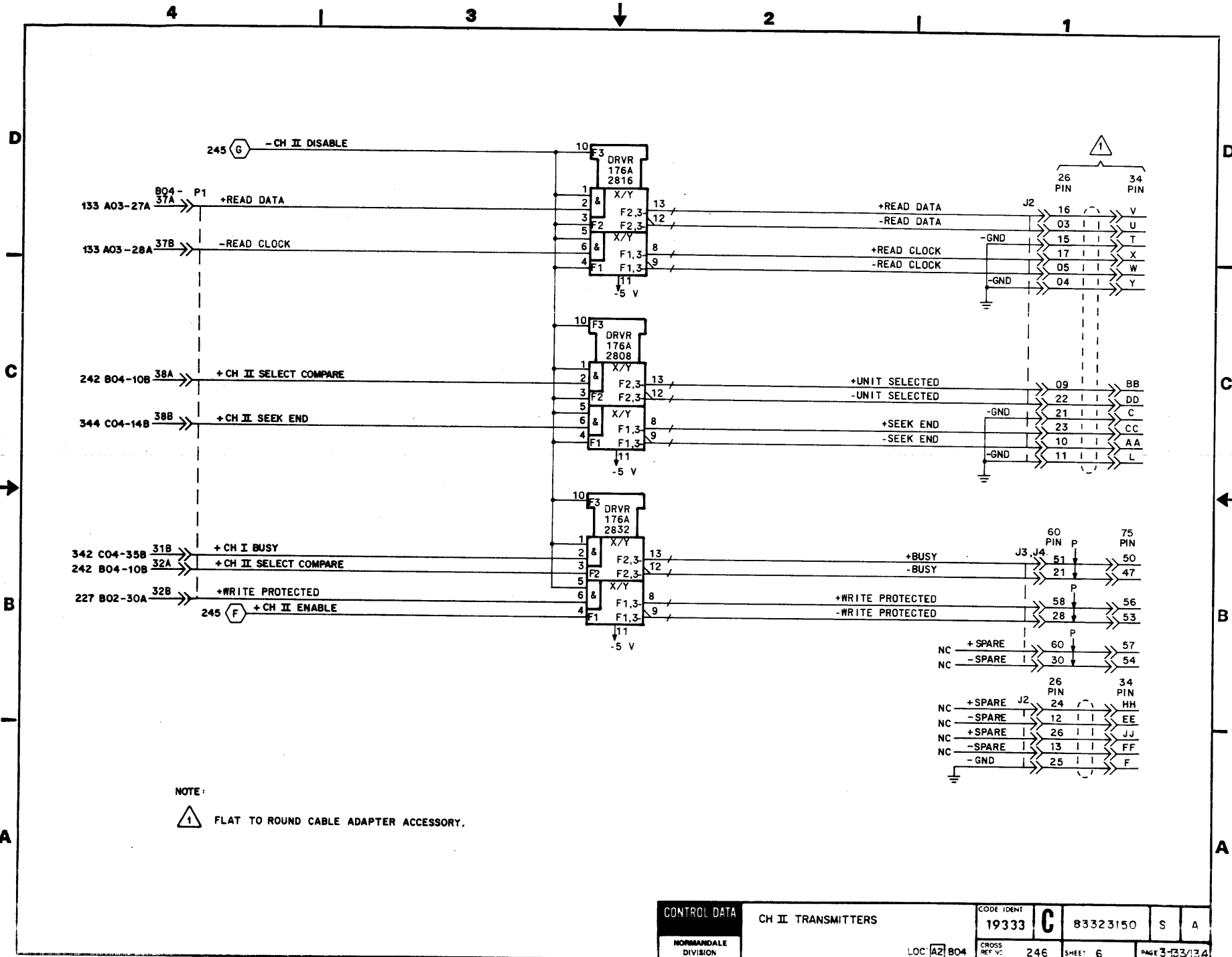


NOTE:
 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

APPLICABLE ONLY TO UNITS WITHOUT LONG LAST SECTOR.

CONTROL DATA	CH II TRANSMITTERS		CODE IDENT	19333	C	83323150	S	A
	NORMANDEALE DIVISION	LOC: A2 B04	CROSS REF NO	245	SHEET	5	PAGE	3-131





NOTE:
 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

REVISION STATUS OF SHEETS																				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
A	A	A	A	A	A															
B	A	A	A	B	A															
C	C	A	A	B	A															

REVISIONS					
REV.	ECO.	DESCRIPTION	DRFT	DATE	CHK'D
A	PE23000	RELEASED		7/77	
B	PE62248	CORRECTIONS		3-18-81	
C	DJ02075	TC CHANGE		MJ 1-6-82	

UNUSED RESISTOR PACKS

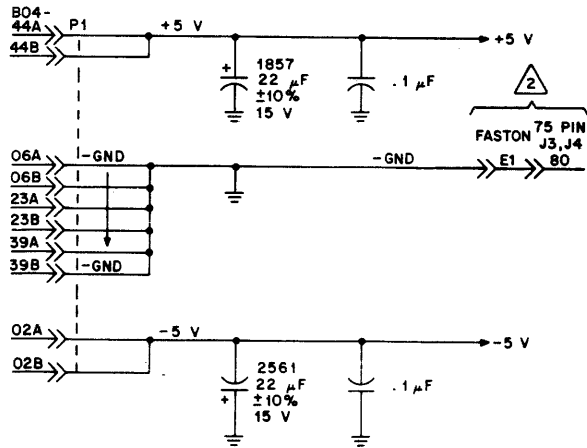
LOCATION	PINS
0264	4,7
1014	4,7,8
1026	6
1044	5,7,8
1054	3,7,8

UNUSED LOGIC ELEMENTS

ELEMENT	LOCATION	OUTPUT PIN(S)
175LS	0228	5,6

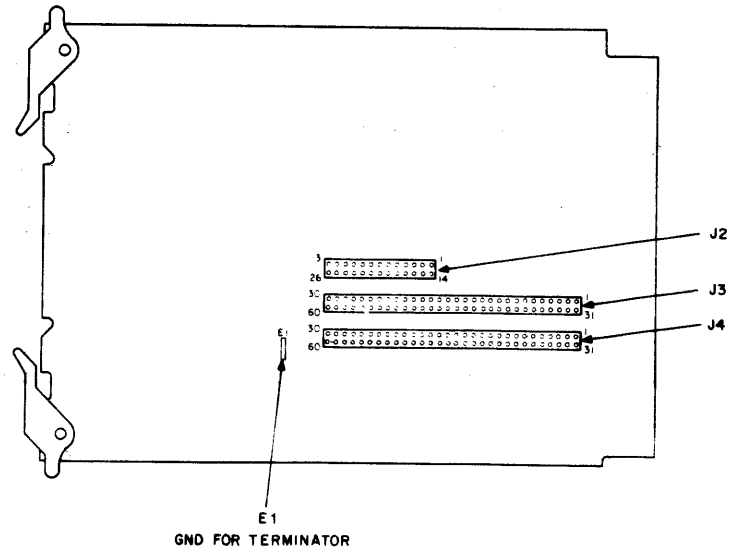
NOTES:

- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.



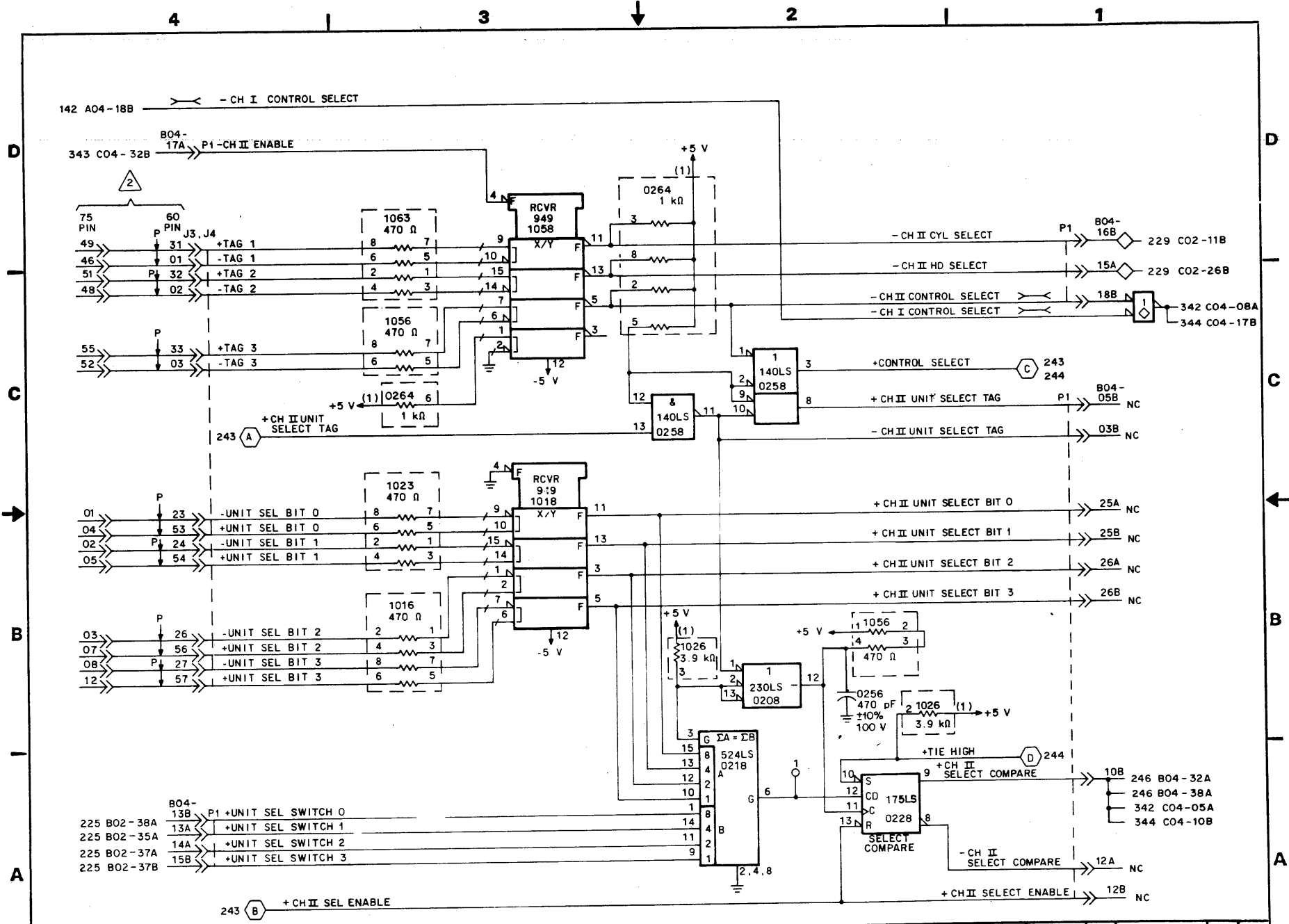
.1 µF FILTER CAPS

+5 V	-5 V
0214	1012
0226	1122
0235	1032
0245	1042
0255	1147
1015	1262
1025	2812
1035	2822
1145	2830
1155	2837
2814	2845
2823	2855
2831	
2838	
2846	
2854	



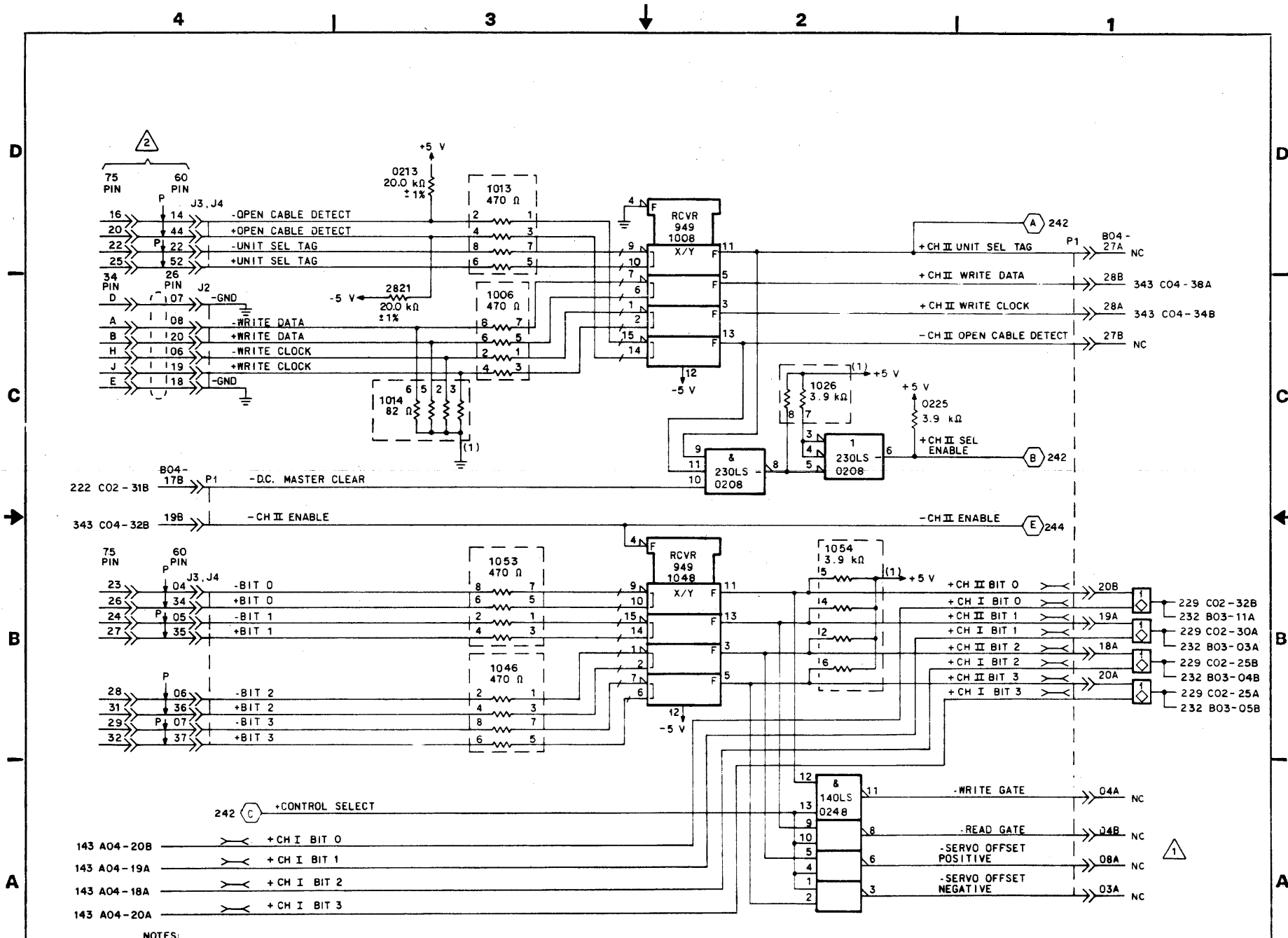
APPLICABLE ONLY TO DUAL CHANNEL UNITS.

DRAWN	M. Johnson 2/5/60	CONTROL DATA	CHANNEL II I/O DIAGRAMS	CODE IDENT	19333	C	83323150	U	C
CHECKED				CROSS REF	241			SHEET	1 of 6
ENGINEER		NORMAN DALE DIVISION	TYPE DFAX	LOC	A2 B04			PAGE	3-135
APPROVED									

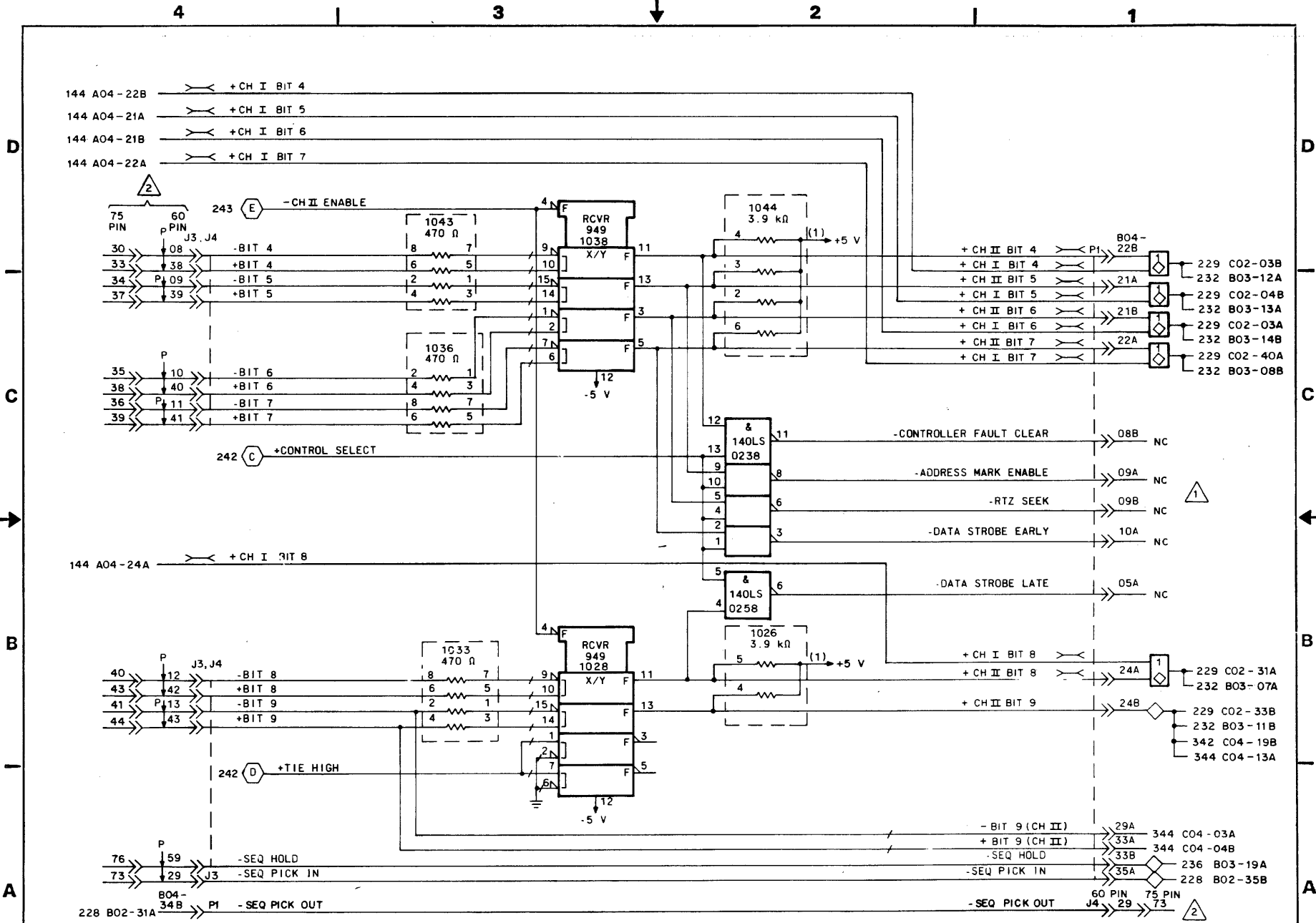


NOTE:
 1 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA	CH II RECEIVERS AND UNIT SELECT		CODE IDENT	C	83323150	U	C
	NORMANDE DIVISION	LOC: A2 B04	CROSS REF NO 242				

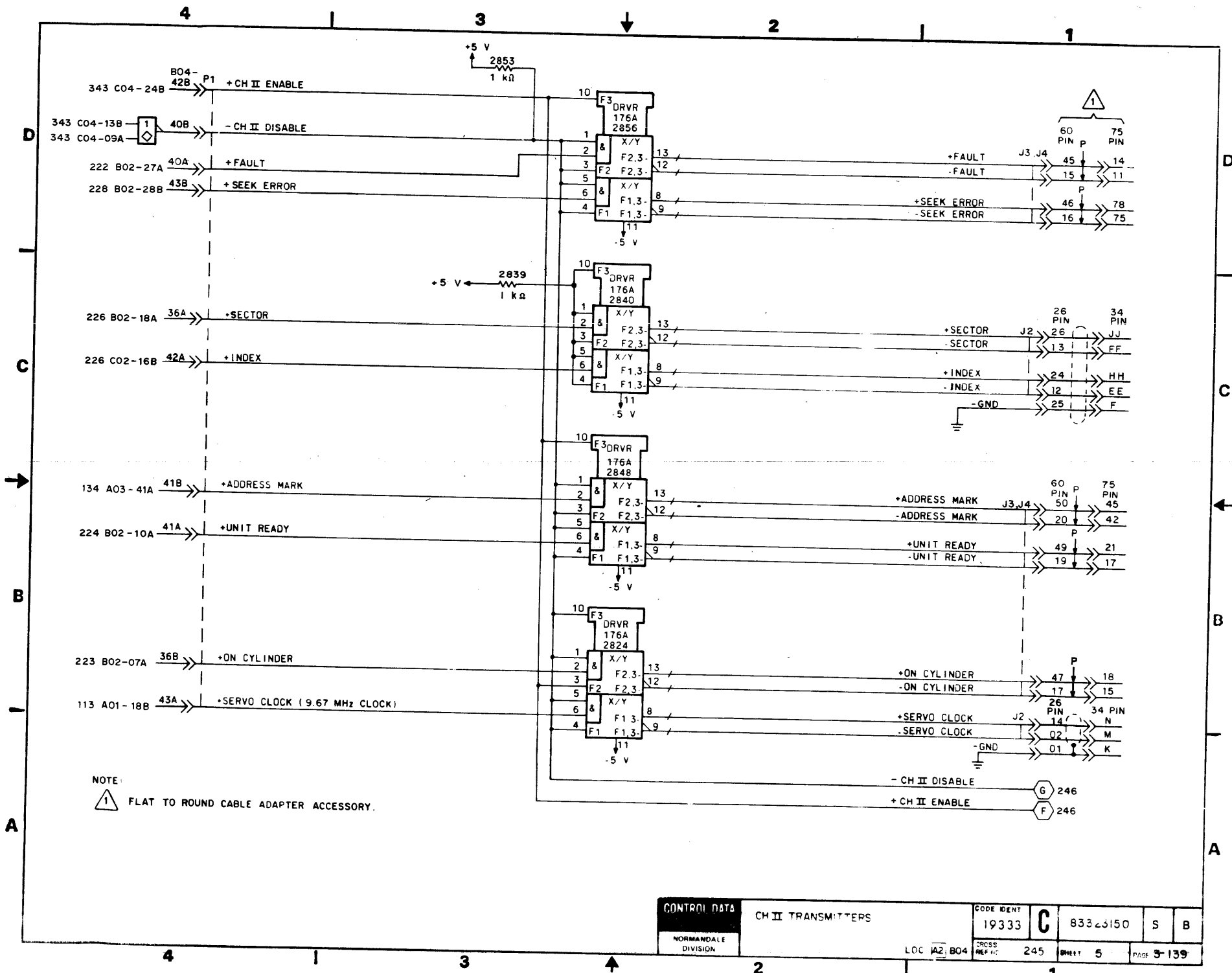


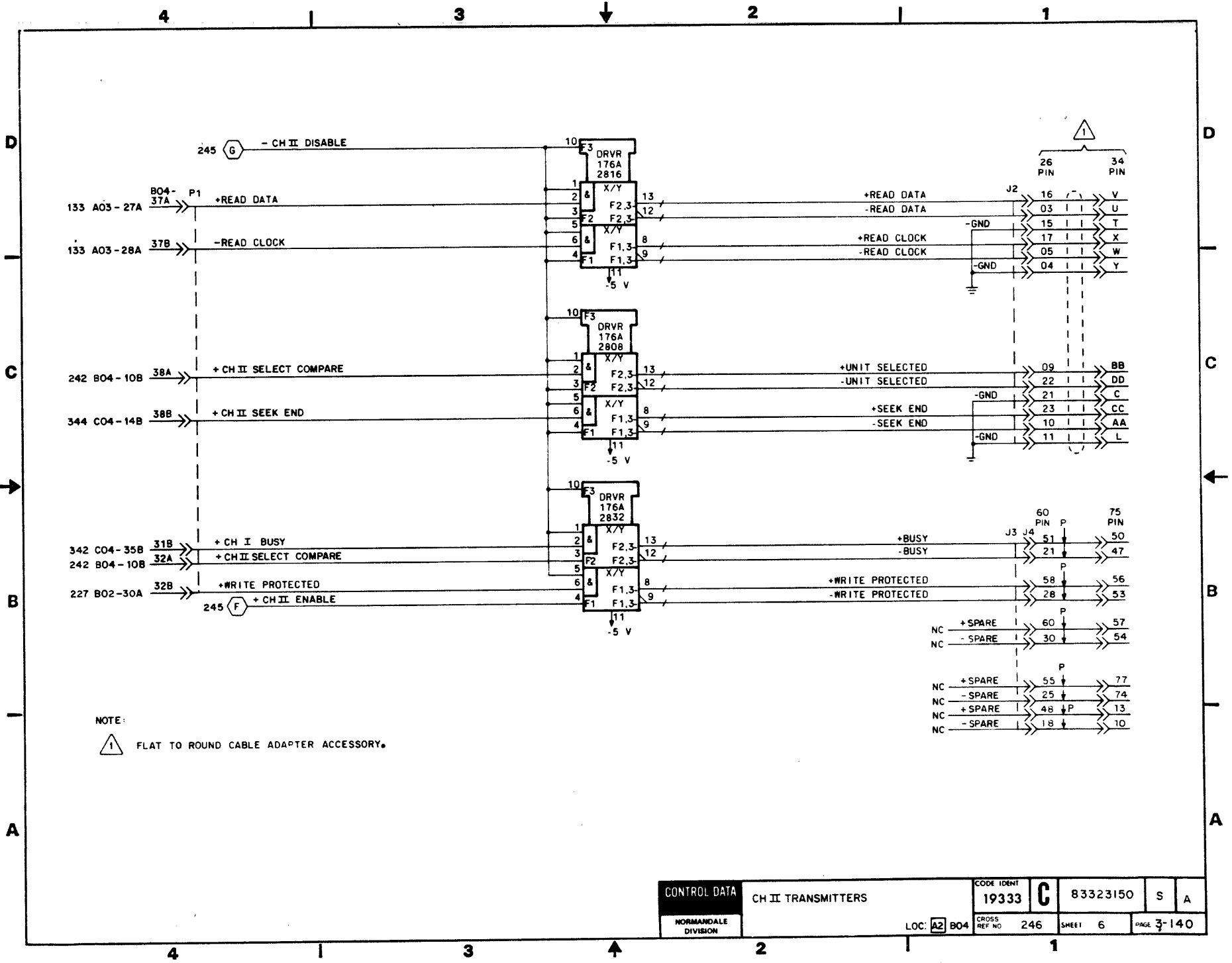
NOTES:
 ① THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NC 143
 ② FLAT TO ROUND CABLE ADAPTER ACCESSORY.



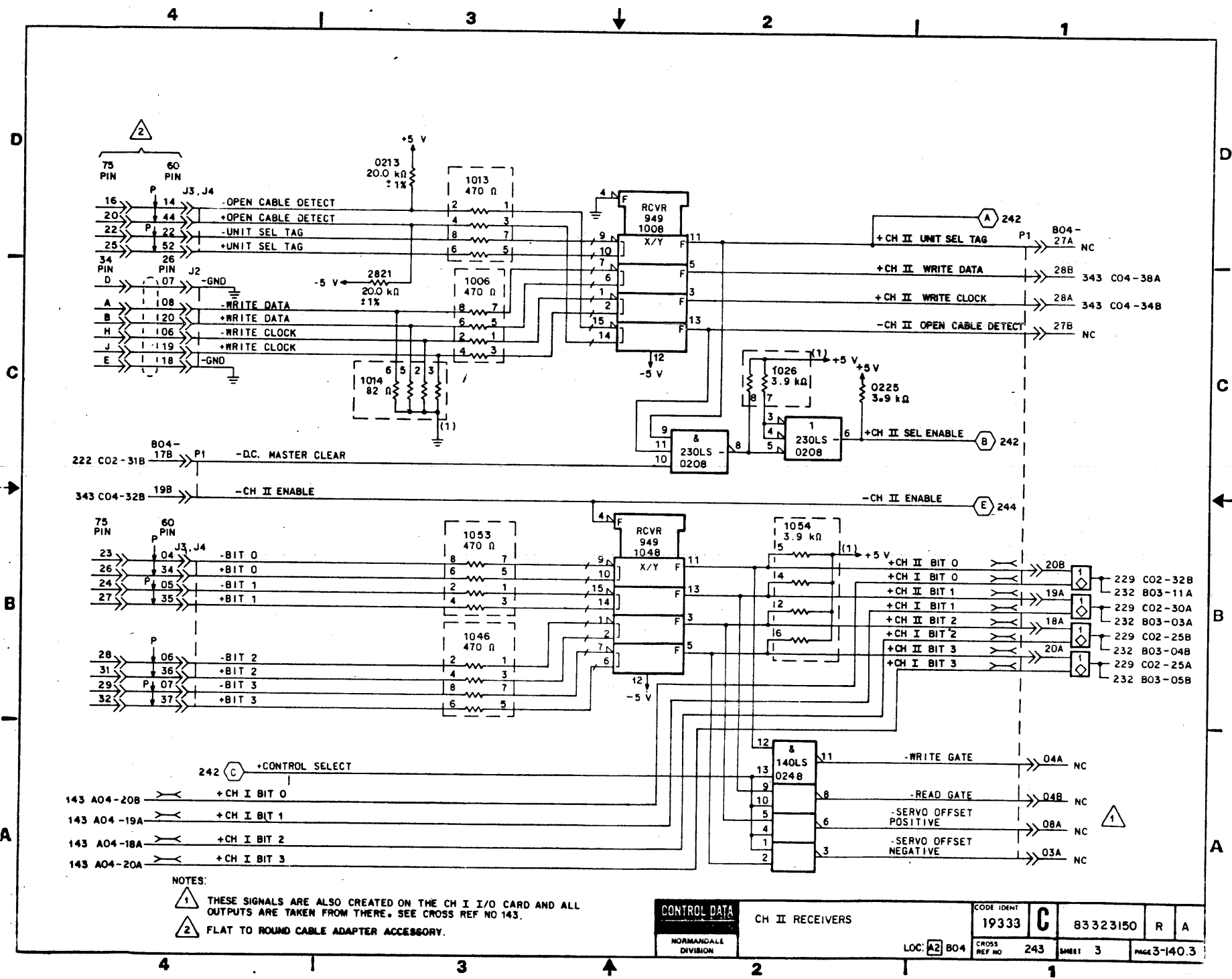
NOTES:
 1 THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 144
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA NORMANDEALE DIVISION	CH II RECEIVERS AND SEQ POWER		CODE IDENT 19333	C	83323150	S	A
	LOC: A2	B04	CROSS REF NO 244	SHEET 4	PAGE 3-138		





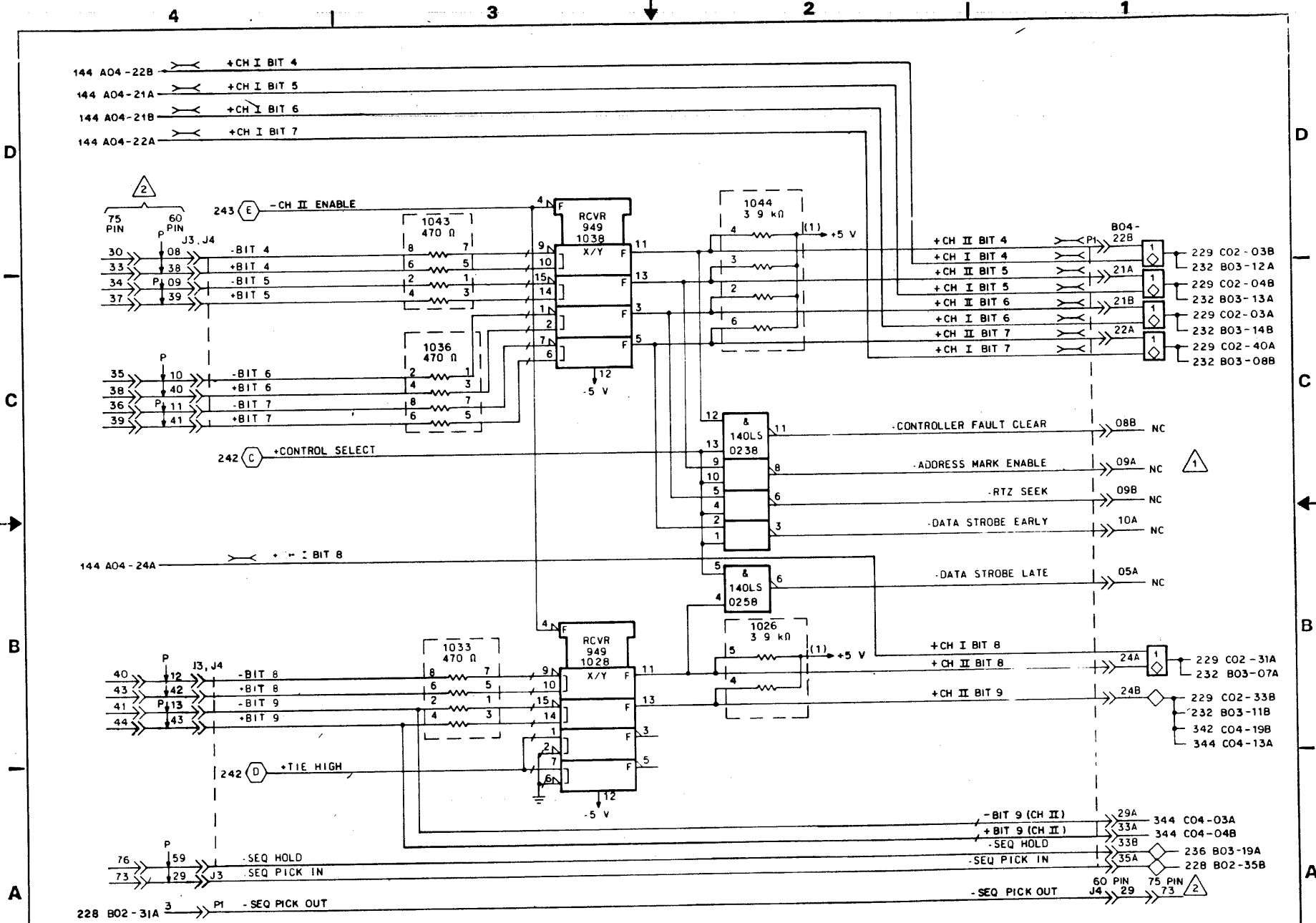
NOTE:
 FLAT TO ROUND CABLE ADAPTER ACCESSORY.



NOTES:

- ① THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 143.
- ② FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA NORMANDALE DIVISION	CH II RECEIVERS		CODE IDENT	C	83323150	R	A
	LOC: A2 B04	CROSS REF NO: 243	SHEET: 3				



NOTES
 1 THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 144

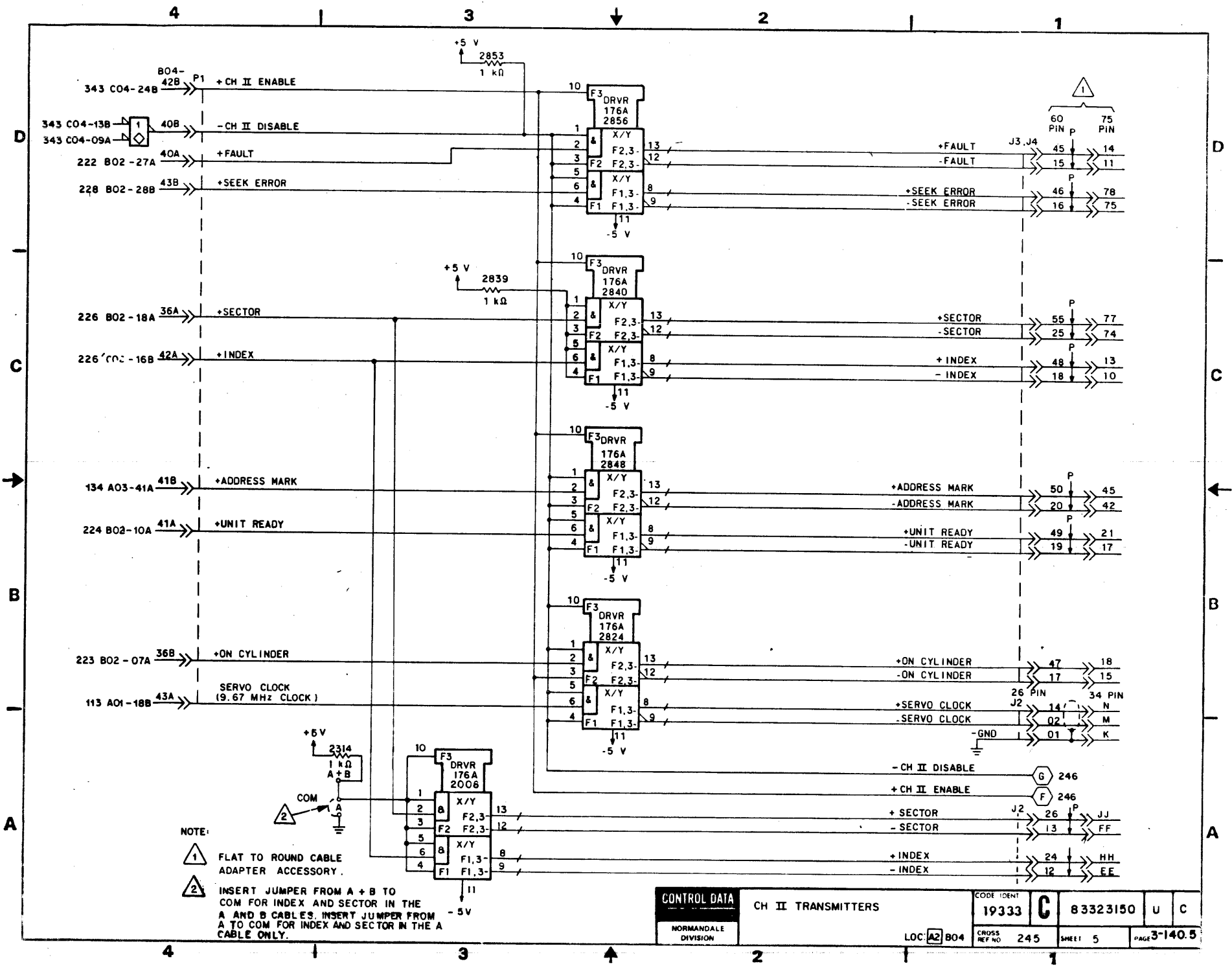
2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

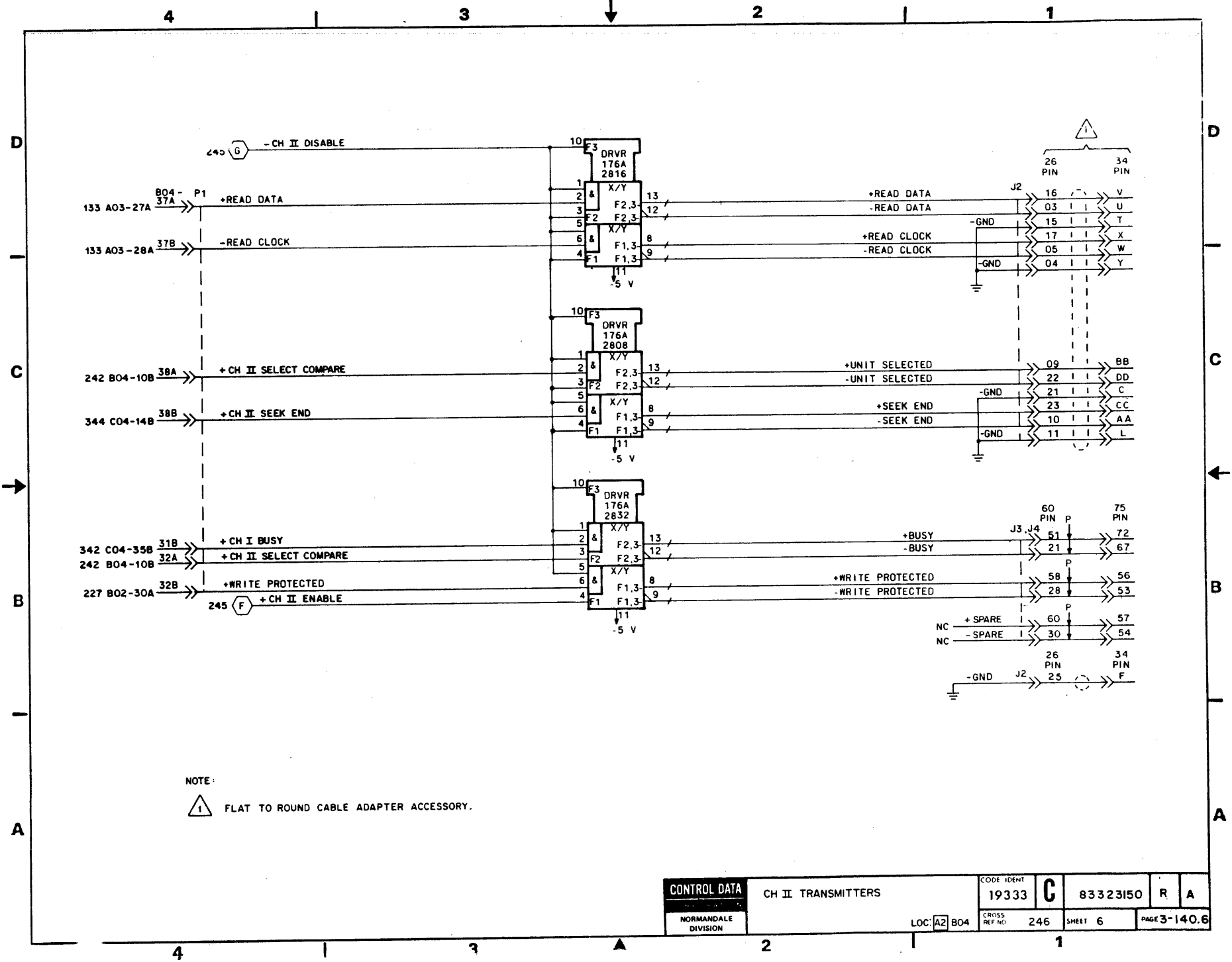
CONTROL DATA
 NORMANDALE DIVISION


CH II RECEIVERS AND SEQ POWER

CODE IDENT 19333	C	83323150	R	A
CROSS REF. NO 244	SHEET 4	PART 3-140.4		

LOC: A2 B04





NOTE:
 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA NORMANDEALE DIVISION	CH II TRANSMITTERS		CODE IDENT 19333	C	83323150	R	A
	LOC: A2	B04	CROSS REF NO 246	SHEET 6	PAGE 3-140.6		

REVISION STATUS OF SHEETS																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A	A	A														
B	B	B	A	A	B														
C	B	C	A	A	B														

REVISIONS					
REV.	ECO.	DESCRIPTION	DRFT	DATE	CHK'D
A	DJ23000	RELEASED	MJ	7-17-83	WJ
B	DJ02355	CHG FAX CARDS	FA	8/13/83	K-D
C	DJ02492	CHG AFFAX BO BLANK	MJ	7-18-83	

UNUSED RESISTOR PACKS

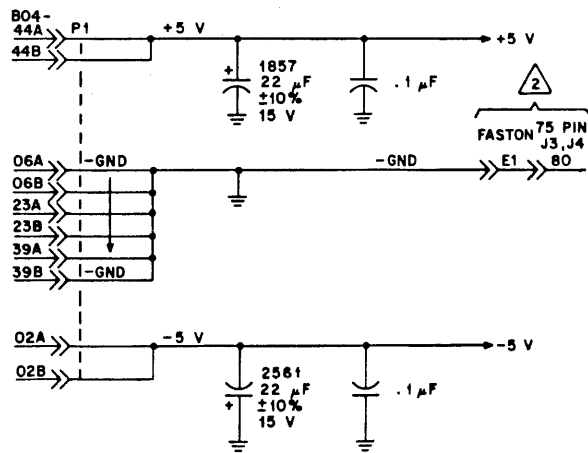
LOCATION	PINS
0264	4,7
1014	4,7,8
1044	5,7,8
1054	3,7,8

UNUSED LOGIC ELEMENTS

ELEMENT	LOCATION	OUTPUT PIN(S)
175LS	0228	5,6

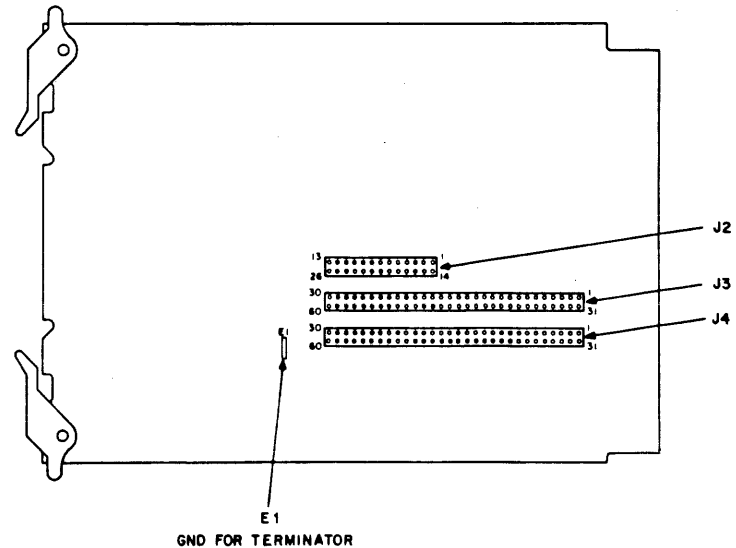
NOTES:

- 1 UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED.
- 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.



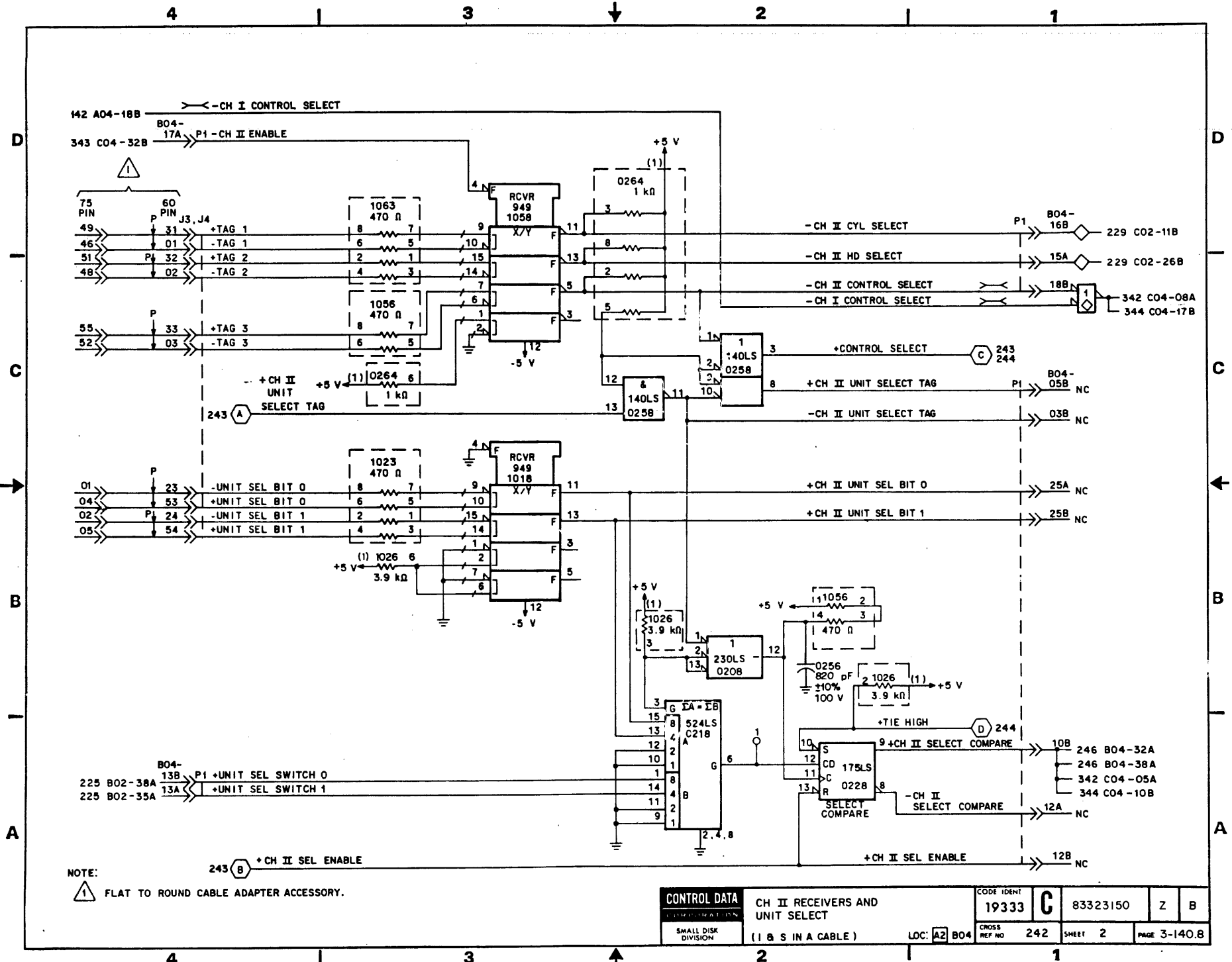
.1 µF FILTER CAPS

+5 V	-5 V
0214	1012
0226	1122
0235	1032
0245	1042
0255	1147
1015	1262
1025	2812
1035	2822
1145	2830
1155	2837
2814	2845
2823	2855
2831	
2838	
2846	
2854	



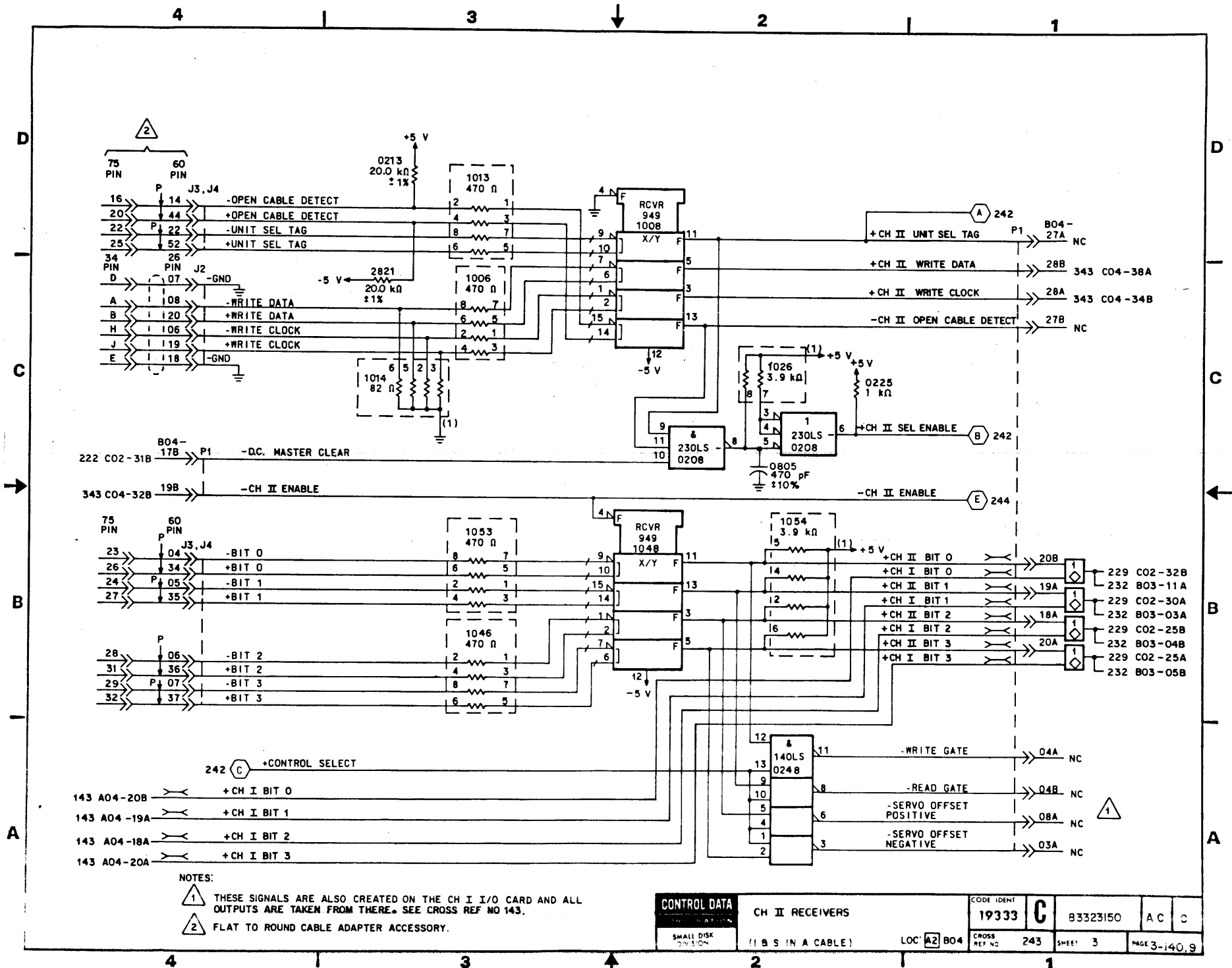
APPLICABLE ONLY TO BZ9A7E/F DUAL CHANNEL UNITS WITH INDEX AND SECTOR IN THE "A" CABLE

DRAWN	M. JAHN	4-12-82	CONTROL DATA	CODE IDENT	19333	C	83323150	AC	C
CHECKED	EX-D	4/13/82							
ENGINEER	W. J. B.	4/13/82	SMALL DISK DIVISION	TYPE: AFFAX	LOC	A2	BO4	CROSS REF NO	241
APPROVED								SHEET	1 of 6
								PAGE	3-140.7



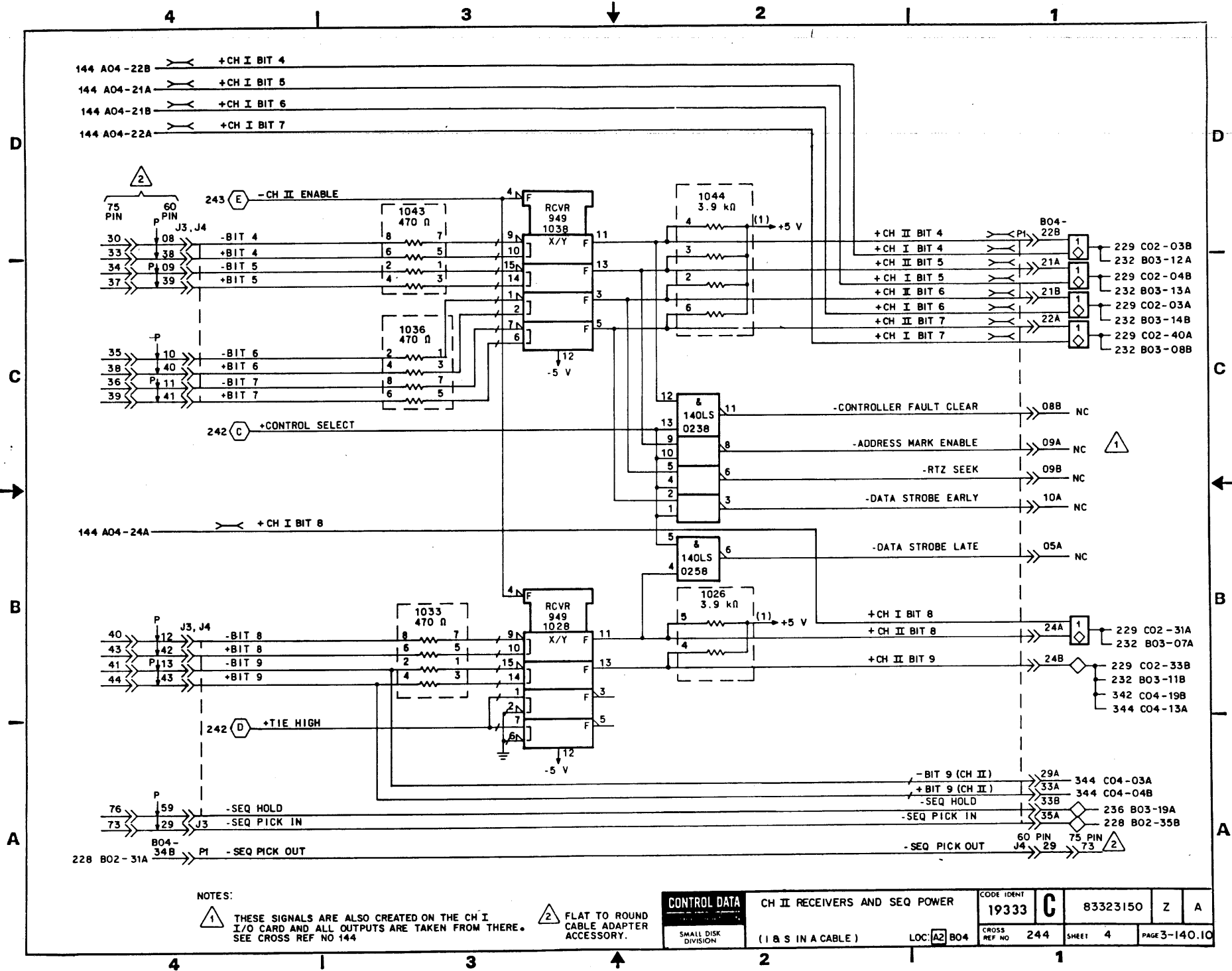
NOTE: △ FLAT TO ROUND CABLE ADAPTER ACCESSORY.

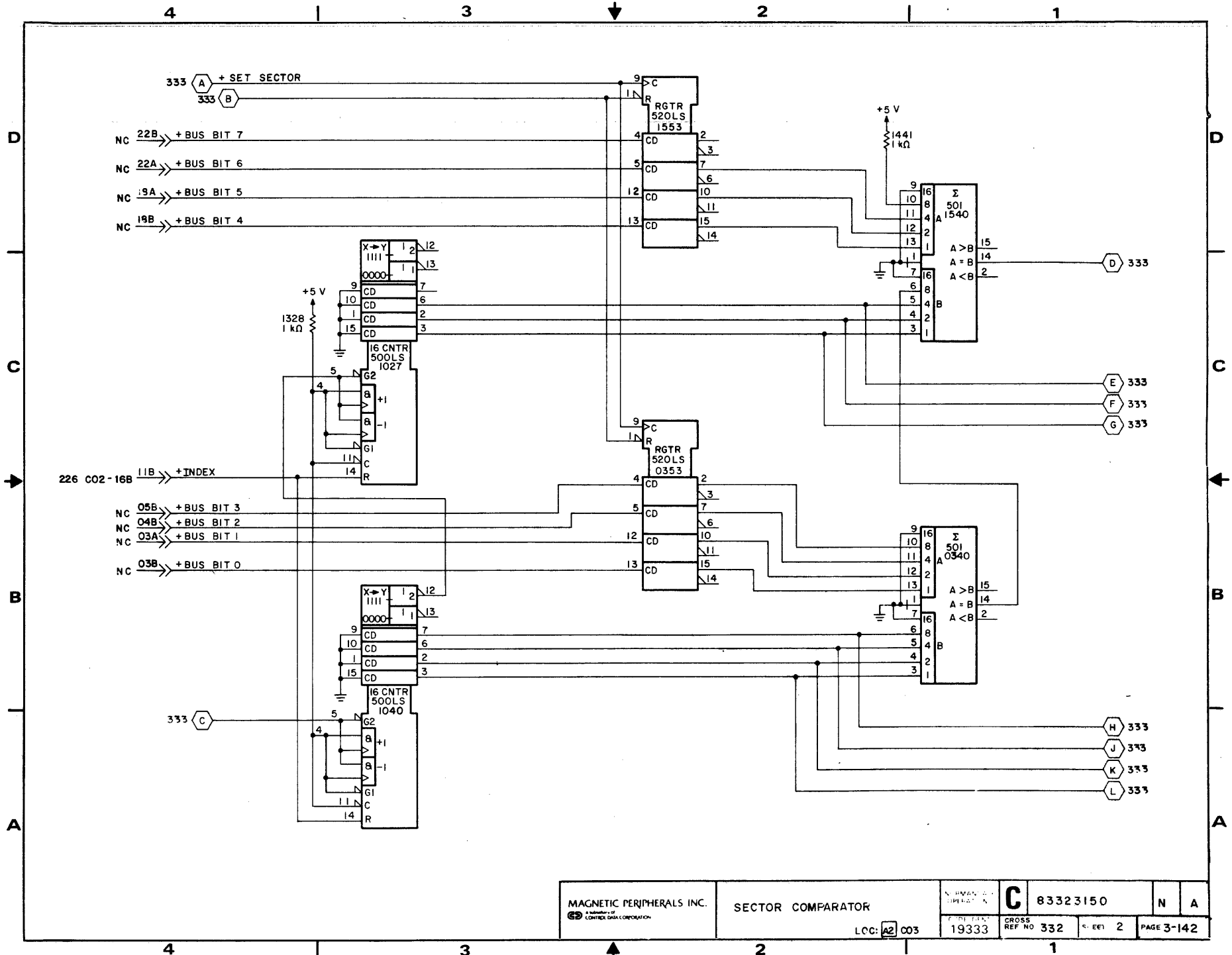
CONTROL DATA	CH II RECEIVERS AND UNIT SELECT		CODE IDENT 19333 C	83323150	Z	B
	SMALL DISK DIVISION	(1 & S IN A CABLE)	CROSS REF NO 242	SHEET 2	PAGE 3-140.8	

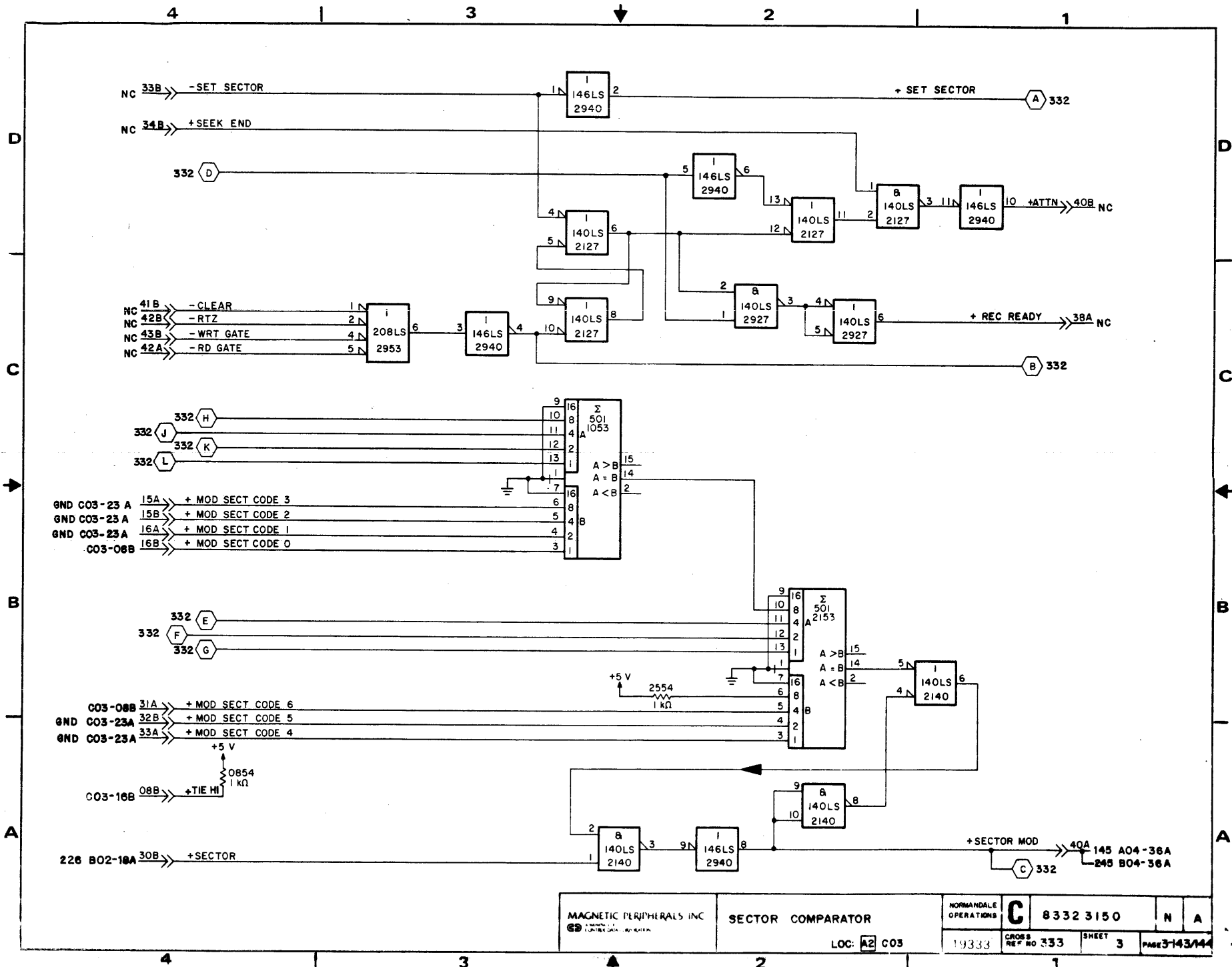


NOTES:
 1 THESE SIGNALS ARE ALSO CREATED ON THE CH I I/O CARD AND ALL OUTPUTS ARE TAKEN FROM THERE. SEE CROSS REF NO 143.
 2 FLAT TO ROUND CABLE ADAPTER ACCESSORY.

CONTROL DATA		CH II RECEIVERS		CODE IDENT	19333	C	B3323150	AC	C
SMALL DISK DIVISION	(1 B S IN A CABLE)	LOC: A2 B04	CROSS REF NO	243	SHEET	3	PAGE	3-140,9	



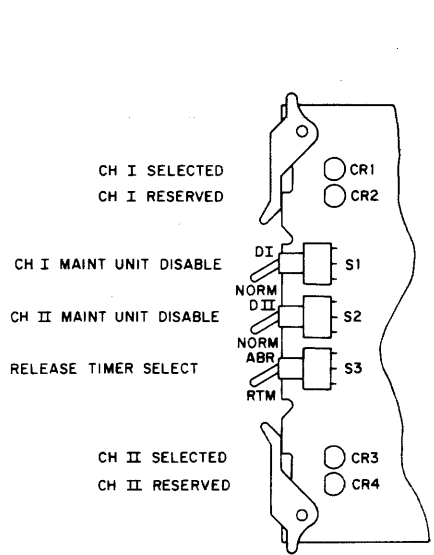
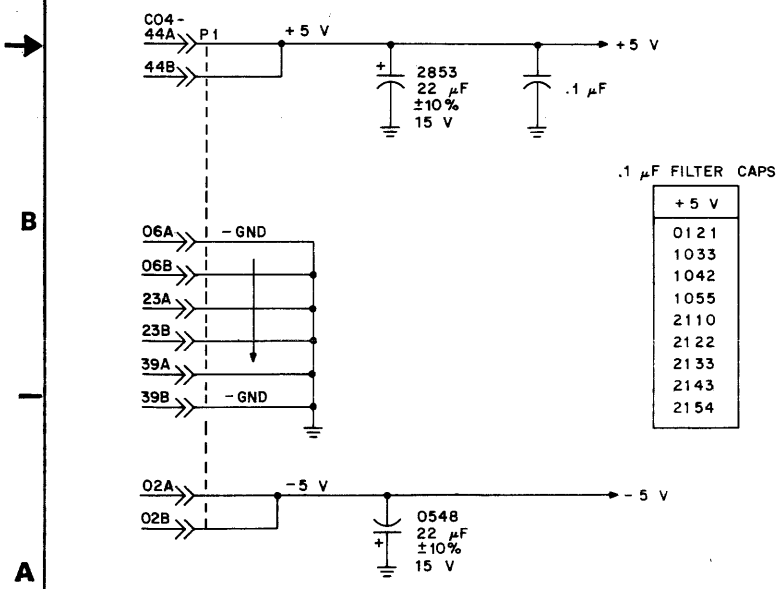




REVISION STATUS OF SHEETS																			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A																
B	B	B	A																

REVISIONS				
REV.	NO.	DESCRIPTION	DRFT.	DATE CHG'D
A	PE23000	RELEASED		
B	DJ02541	UPDATE LOGIC	MJ	7-18-83

UNUSED LOGIC ELEMENTS		
ELEMENT	LOCATION	OUTPUT PIN(S)
193	1842	5,12
146LS	2321	10
202LS	2814	6



NOTES:

1. UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED EXCEPT PINS 9 AND 10 OF 193 ARE OPEN.

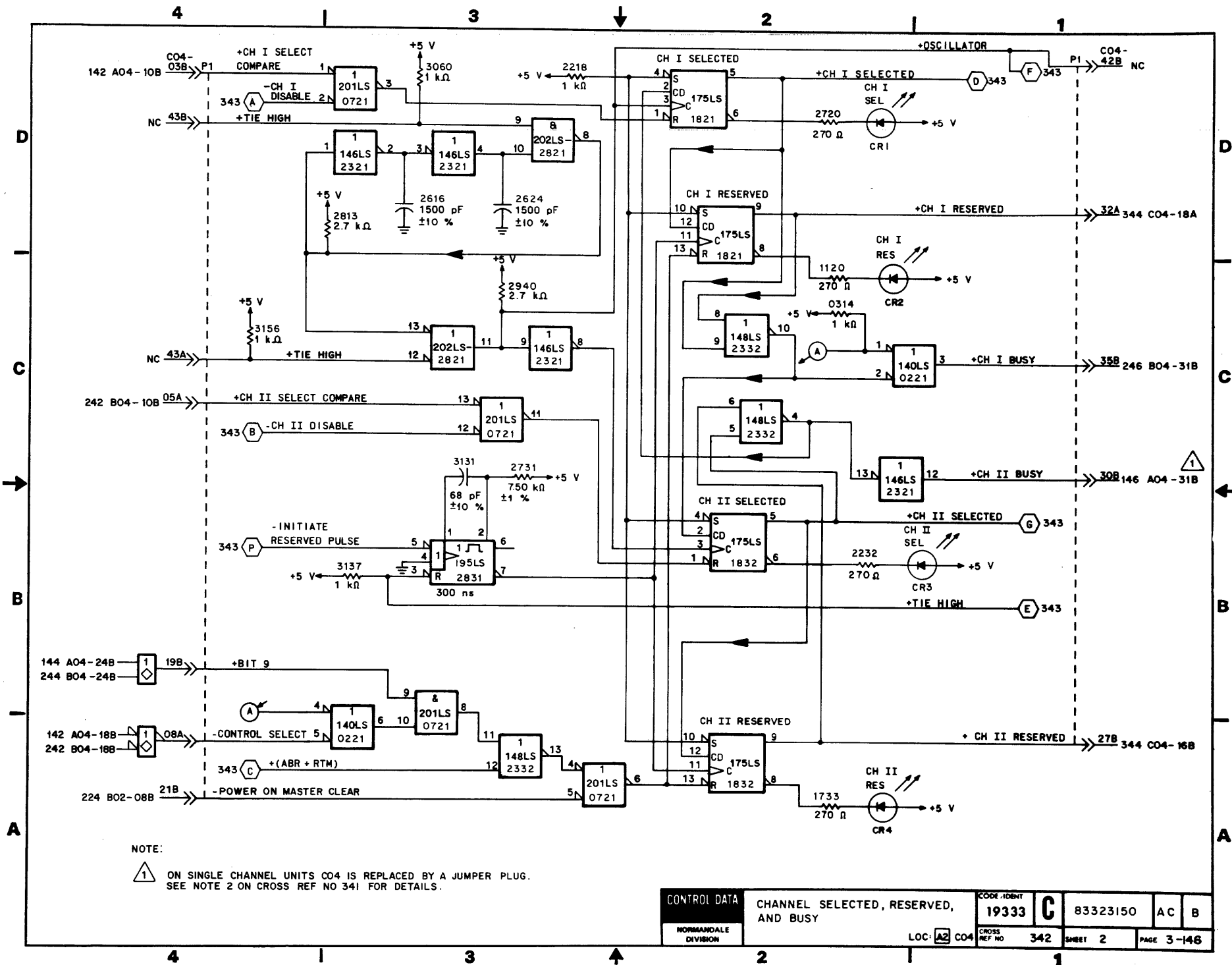
2. ON SINGLE CHANNEL UNITS C04 IS REPLACED BY A JUMPER PLUG ON THE W/W SIDE OF THE BACKPANEL. THESE LINES ARE JUMPERED TOGETHER:

344 C04-15B	→	344 C04-20B
344 C04-17A	→	344 C04-18B
GND C04-23B	→	342 C04-30B
343 C04-30A	→	343 C04-31B
343 C04-33A	→	343 C04-33B
343 C04-35A	→	343 C04-36A

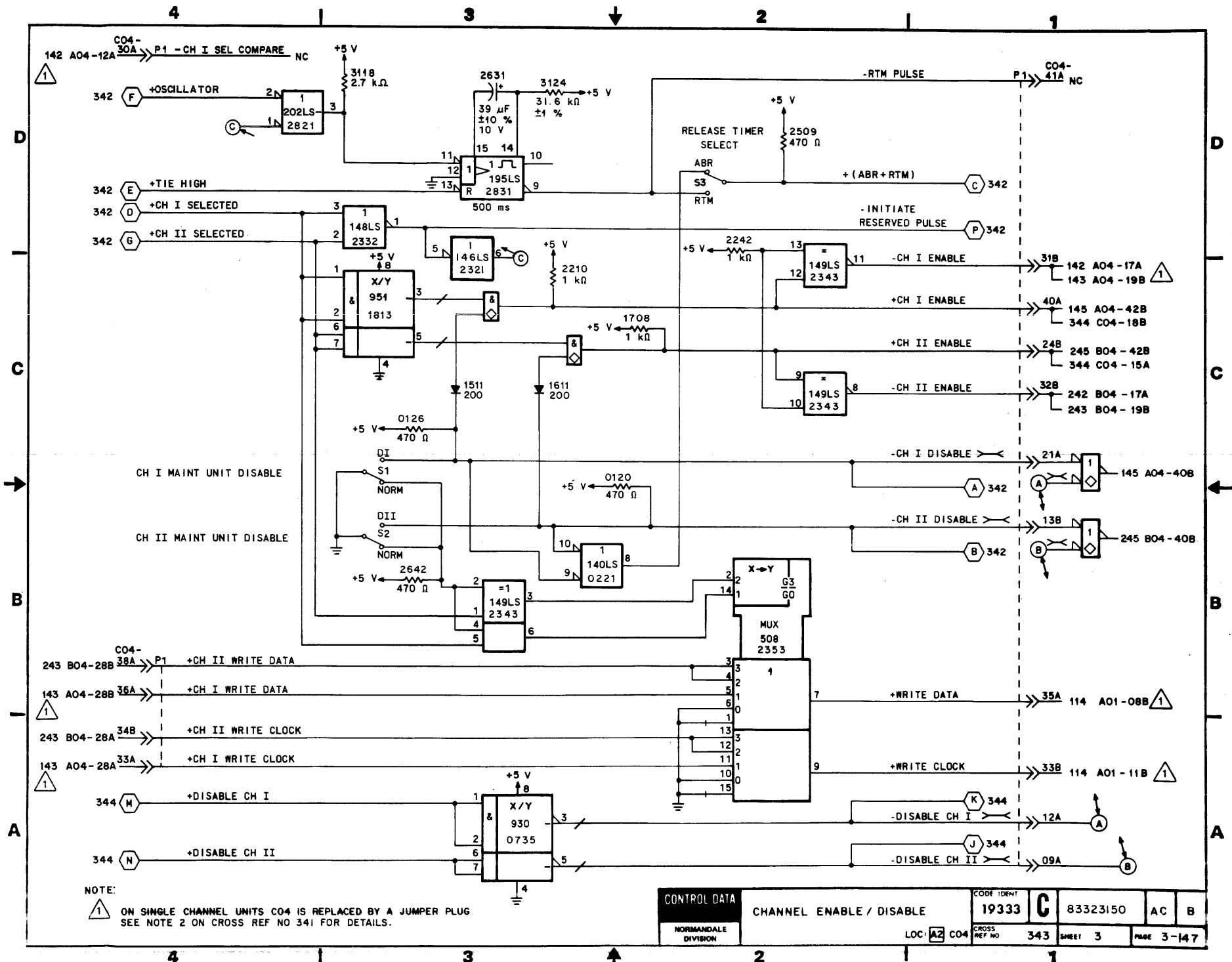
SEE CROSS REF NO INDICATED FOR SIGNAL ORIGINS AND DESTINATIONS.

APPLICABLE ONLY TO DUAL CHANNEL UNITS 2

DRAWN	G. RADJAK 4-4-79	CONTROL DATA	CODE IDENT	19333 C	83323150	AC	B
CHECKED							
ENGINEER		NORMAN DALE DIVISION	DUAL CHANNEL STEERING DIAGRAMS	CROSS REF NO	341	SHEET	1 OF 4
APPROVED			TYPE AFBX	LOC	A2 C04	PAGE	3-145

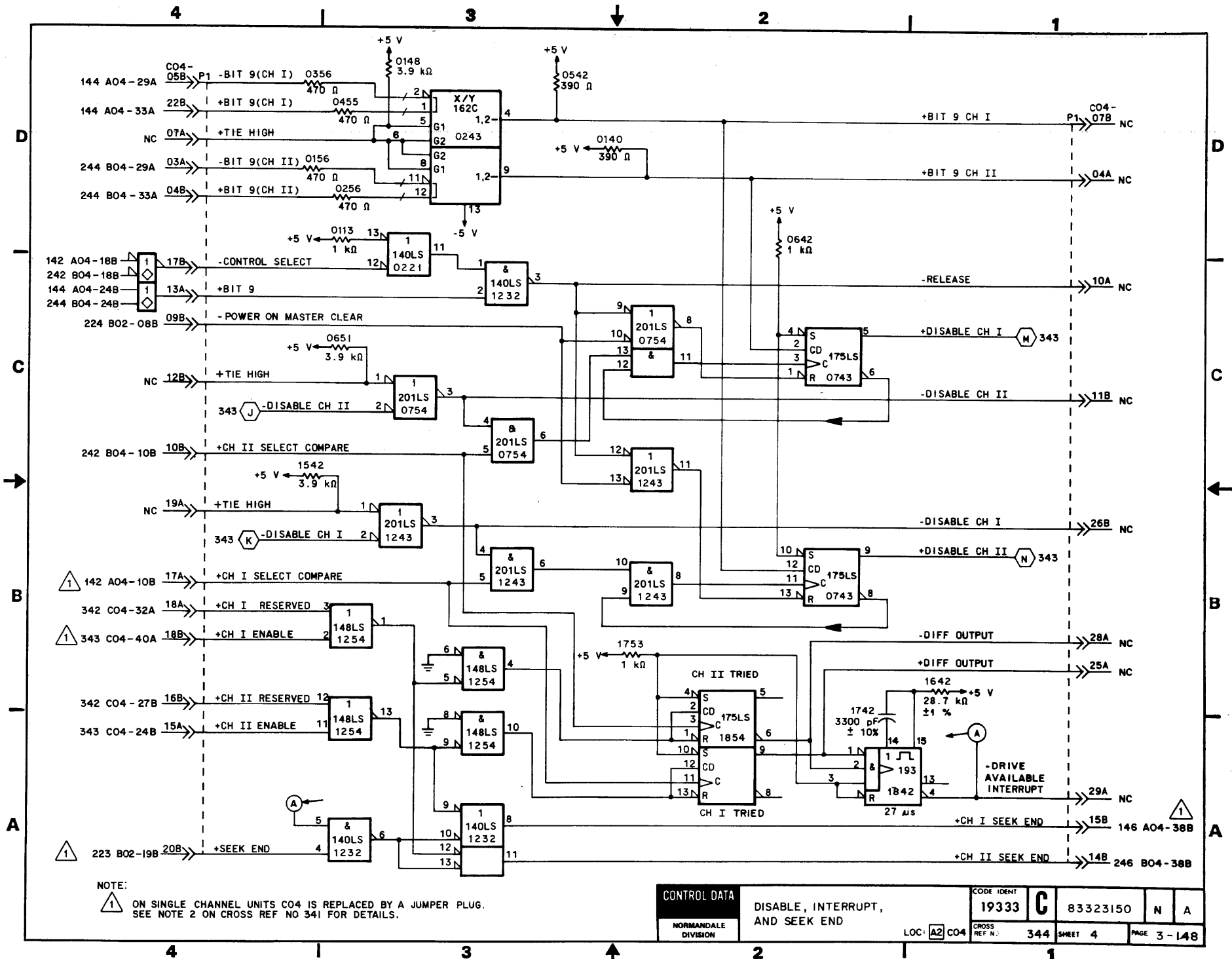


CONTROL DATA	CHANNEL SELECTED, RESERVED, AND BUSY		CODE IDENT	C	83323150	AC	B
	NORMANDEALE DIVISION	LOC: A2 CO4	19333				



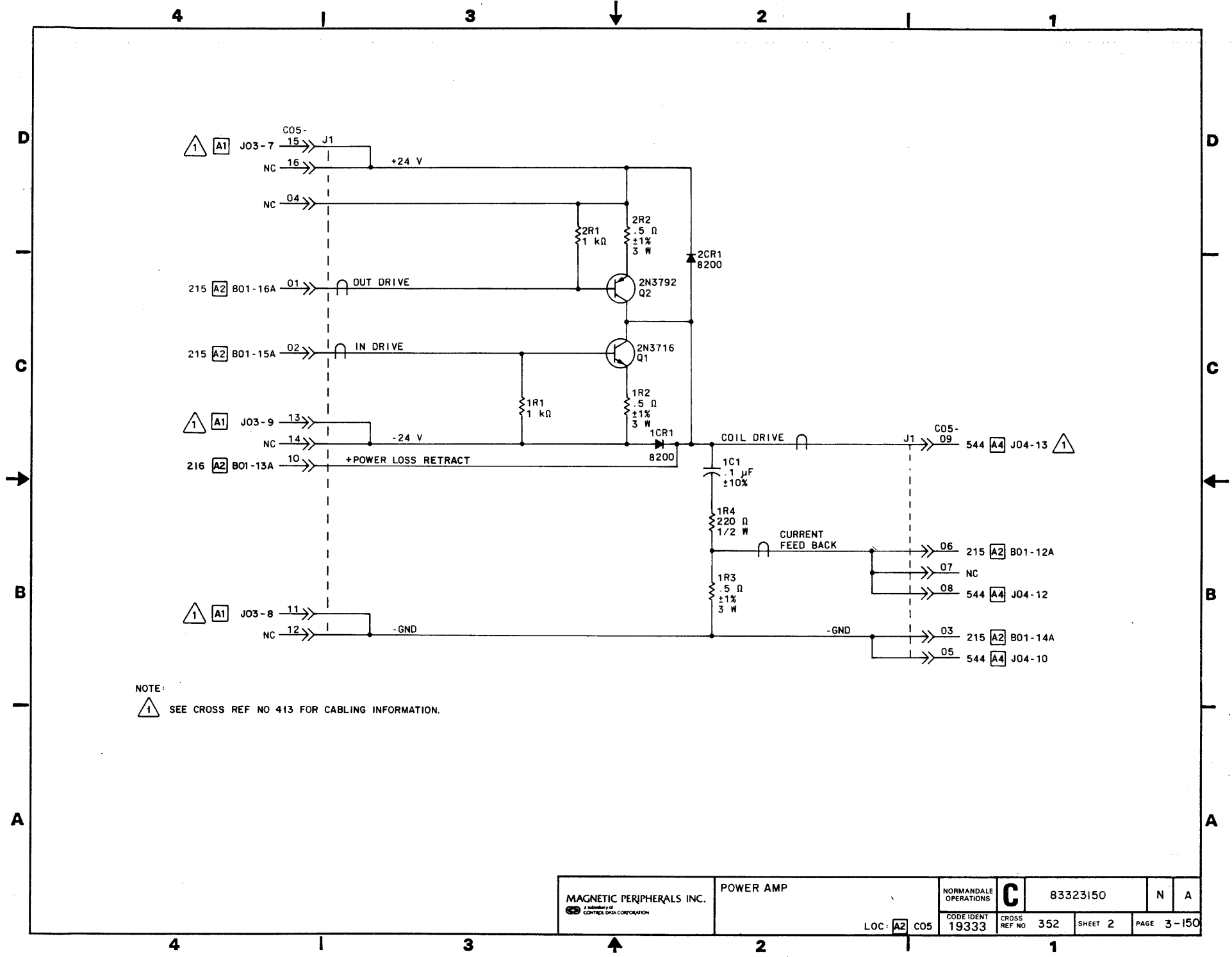
NOTE:
 ⚠ ON SINGLE CHANNEL UNITS CO4 IS REPLACED BY A JUMPER PLUG.
 SEE NOTE 2 ON CROSS REF NO 341 FOR DETAILS.

CONTROL DATA		CODE IDENT	83323150	AC	B
NORMANDEALE DIVISION		19333	C		
LOC: A2 CO4		CROSS REF NO: 343	SHEET: 3	PAGE: 3-147	



NOTE:
 1 ON SINGLE CHANNEL UNITS CO4 IS REPLACED BY A JUMPER PLUG.
 SEE NOTE 2 ON CROSS REF NO 341 FOR DETAILS.

CONTROL DATA		CODE IDENT	19333 C		83323150	N	A
NORMANDEALE DIVISION		DISABLE, INTERRUPT, AND SEEK END		LOC: A2 CO4	CROSS REF N: 344	SHEET 4	PAGE 3-148



4

1

3

2

1

1

REVISION STATUS OF SHEETS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A																	
B	B	A	A																	
C	B	C	A																	

REVISIONS

REV	ECO	DESCRIPTION	DRFT	DATE	CHK'D
2	PE23000	RELEASED			
B	PE49146	CORRECT LOGIC DIA	TH	7-25-79	
C	DJ02044	ADD TIME METER	MJ	1-6-82	

D

D

C

C

B

B

B

B

A

A

DRAWN	<i>[Signature]</i>
CHECKED	<i>[Signature]</i>
ENGINEER	7
APPROVED	

MAGNETIC PERIPHERALS INC.
A subsidiary of
COMTEL DATA CORPORATION

MMD CABLING
DIAGRAMS

NORMANDALE
OPERATIONS

C

83323150

U C

CODE IDENT
19333

CROSS
REF NO 411

SHEET
1 OF 4

PAGE
3-151

LOC: A3

REF 75121814

4

1

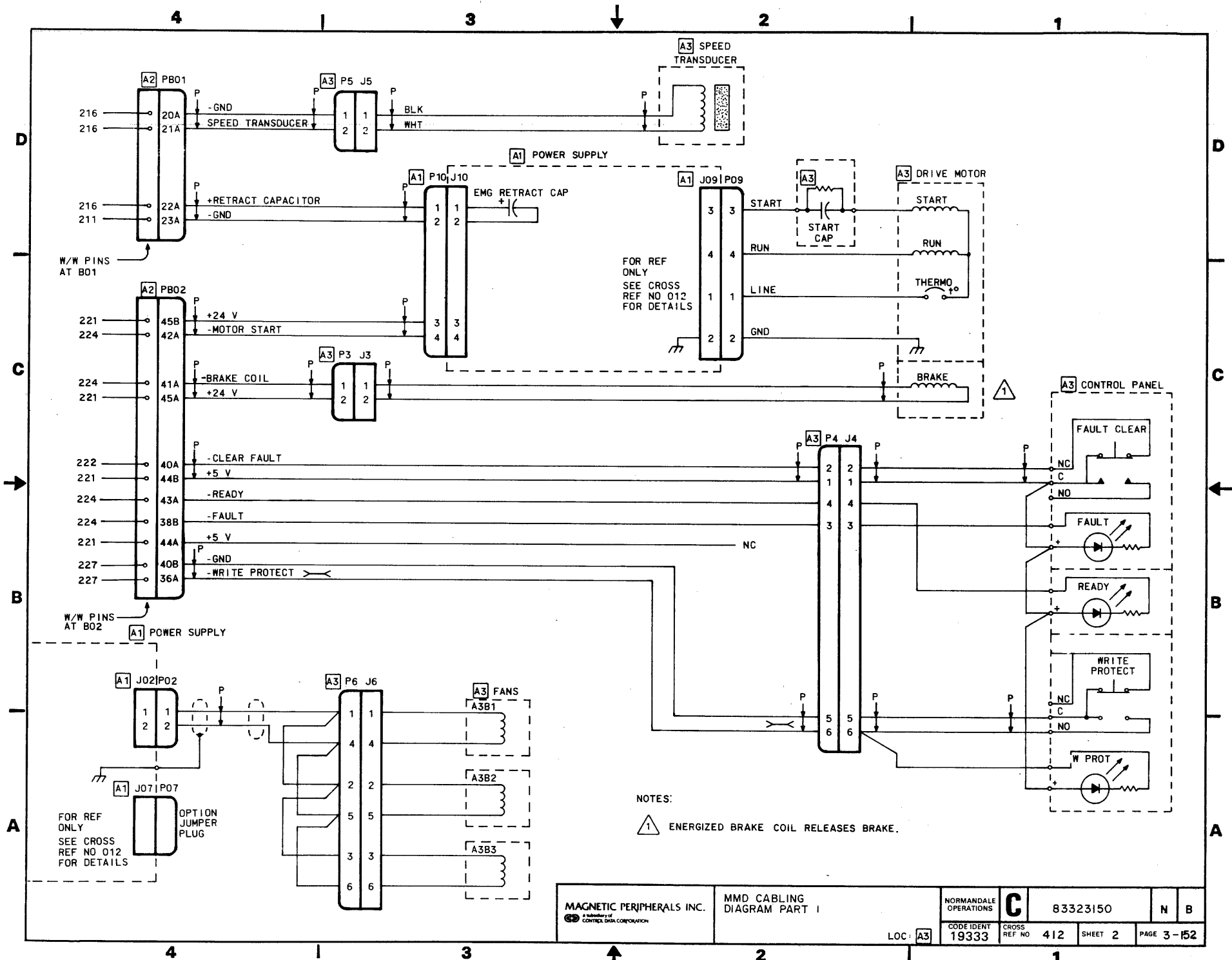
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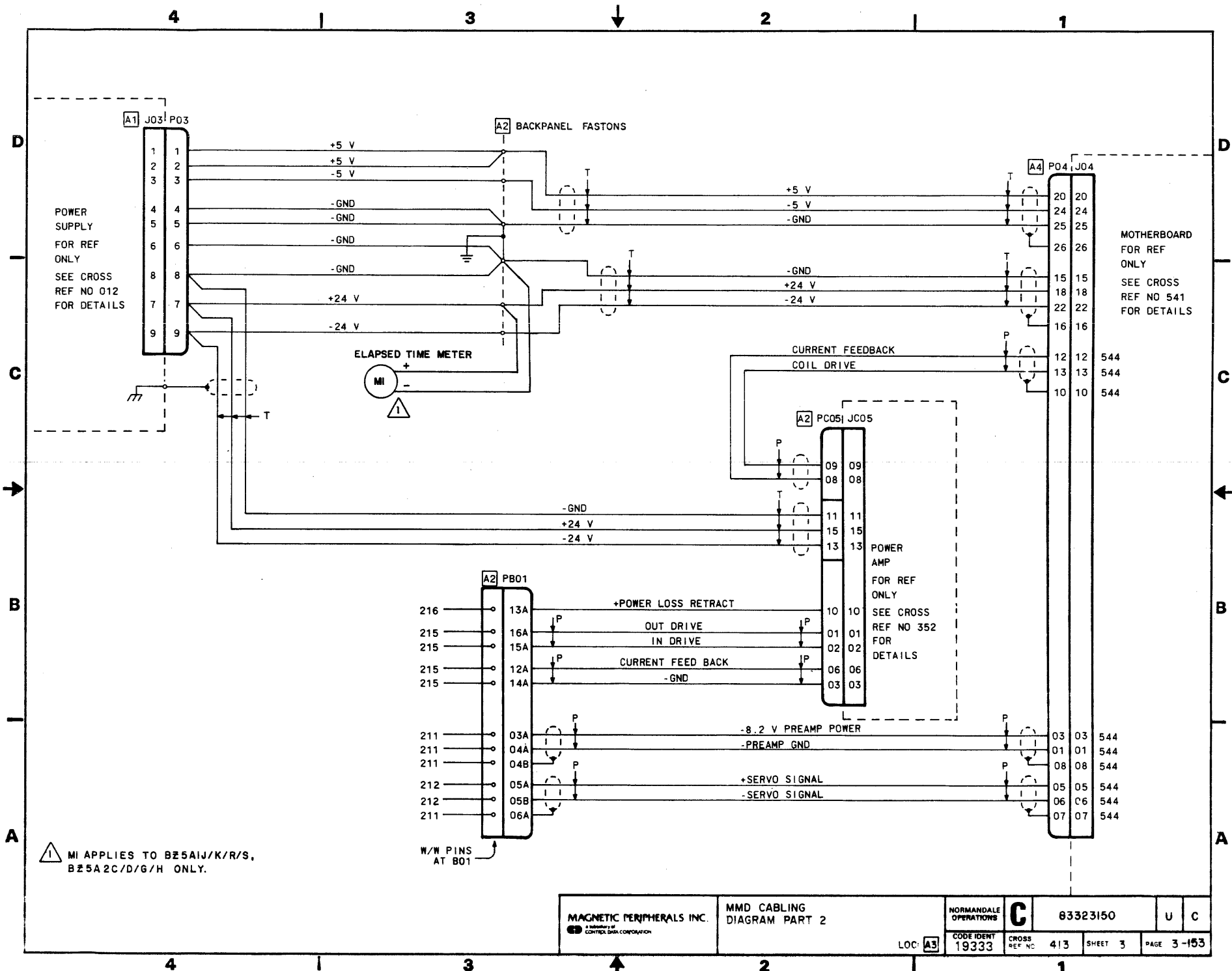
1

2

1

1



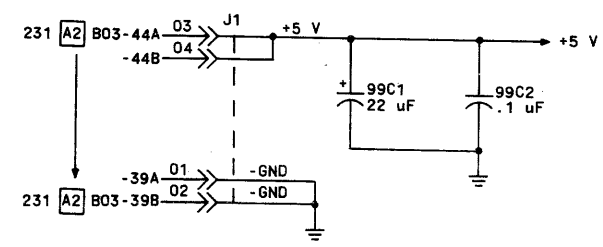
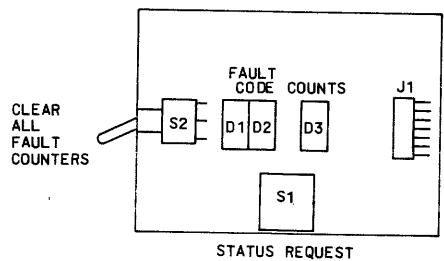


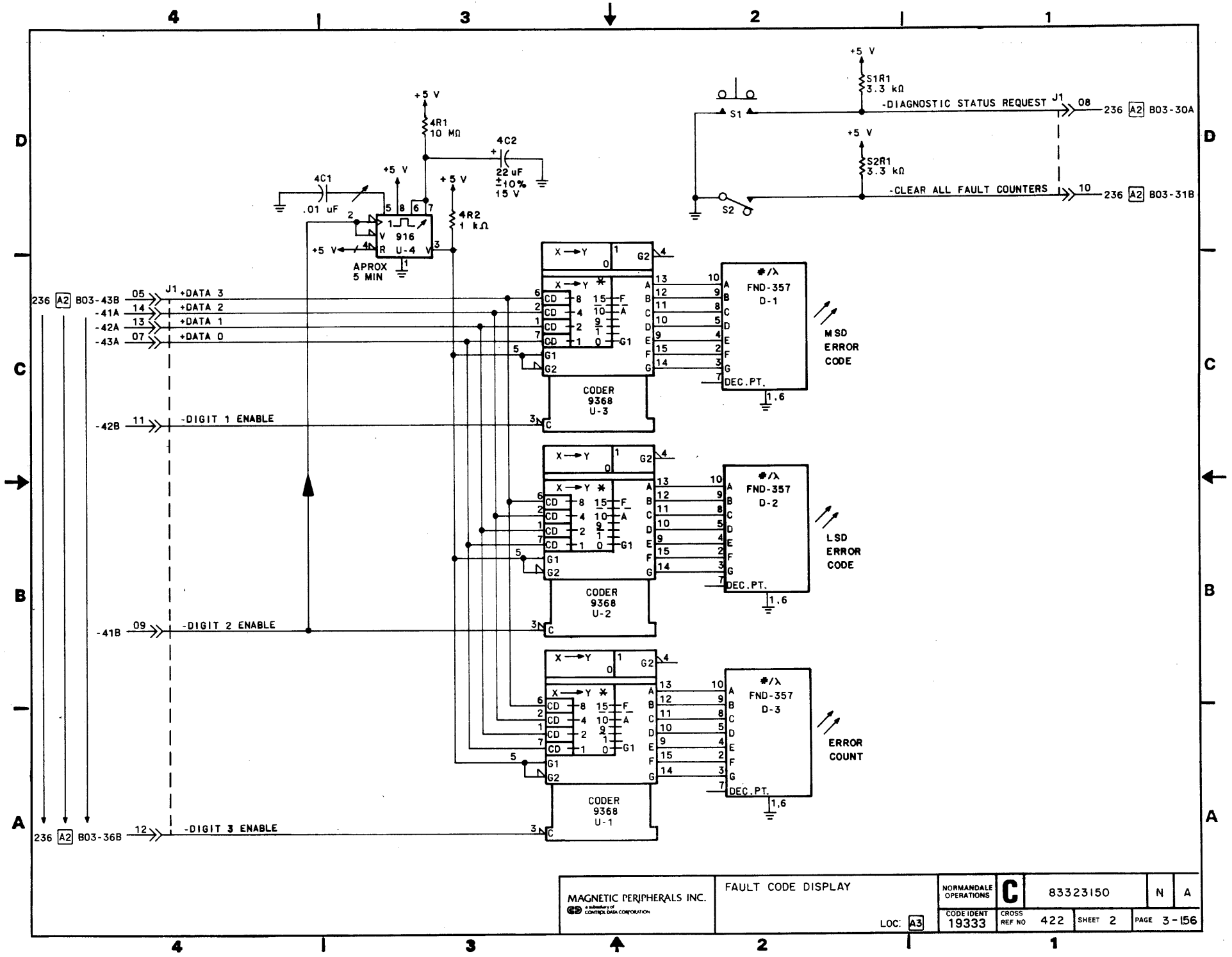
REVISION STATUS OF SHEETS																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A																			
B	A																			
C	A																			
D	A																			

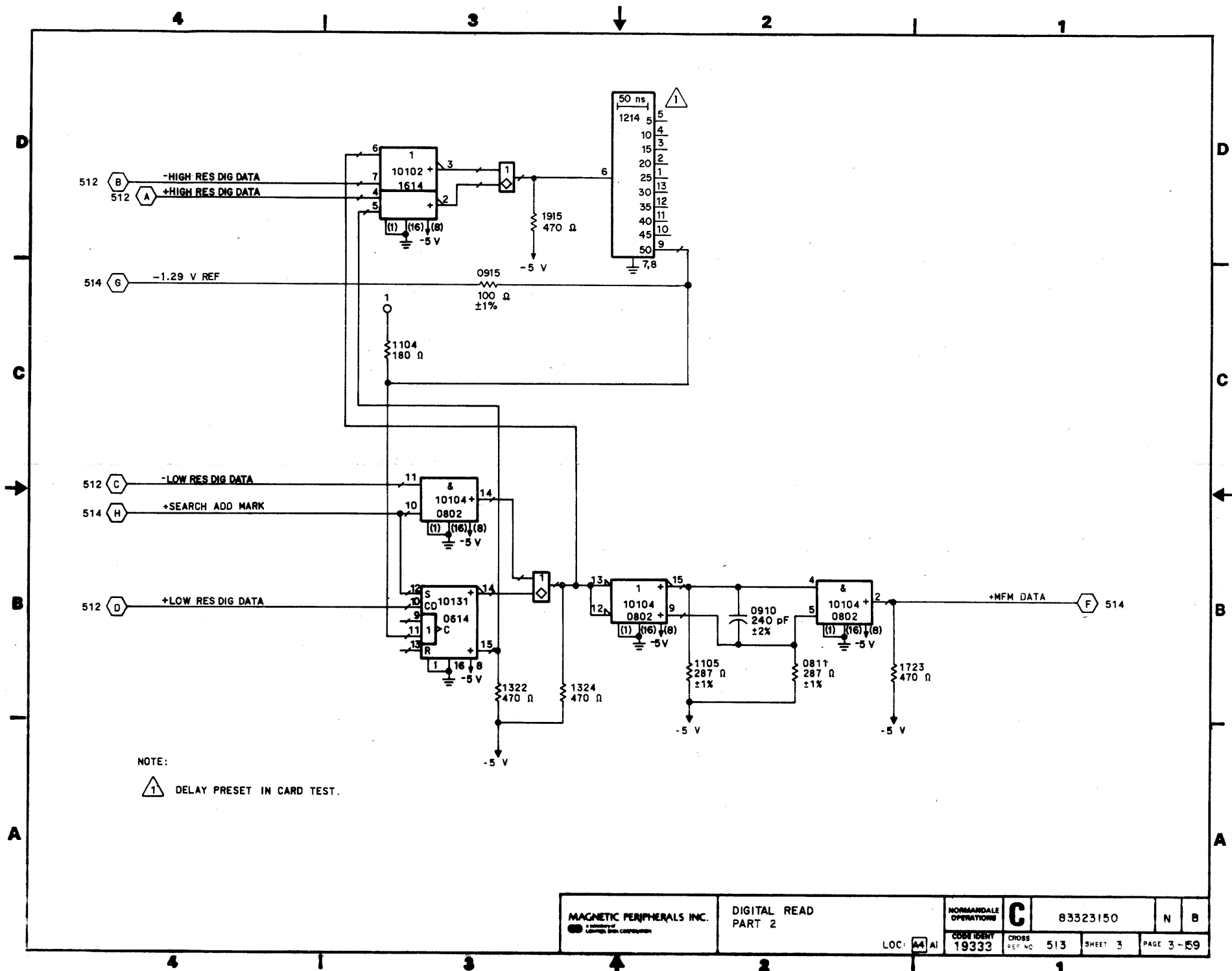
REVISIONS					
REV	ECO	DESCRIPTION	DRFT	DATE	CHK'D
A	PE23000	RELEASED			
B	PE49146	CORRECT LOGIC DIA	TH	7-25-79	
C	PE50705	CORRECTIONS	TH	12-27-79	
D	PE62321	ADD BDZV	MF	8-18-81	

- 1 80-160 M. BYTE MMD
DIAGNOSTIC FAULT CODES
- 1 — VOLTAGE FAULT
 - 2 — NOT ON CYL. & R. OR WR.
 - 3 — WRITE FAULT
 - 4 — HEAD SELECT FAULT
 - 5 — READ AND WRITE FAULT
 - 6 — MICROPROCESSOR FAULT
 - 7 — I/O TEST
 - 8 — NOT USED
 - 9 — DRIFT OFF CYLINDER
 - 10 — MARGINAL MOTOR START
 - 11 — BRAKING FAILURE
 - 12 — EOT INDICATED DURING SEEK
 - 13 — NO LOCK IN 250 M.S.
 - 14 — FIRST SEEK FAILURE
 - 15 — NOT USED
 - 16 — MAX ADDRESS FAULT
 - 17 — FAILED TO COMPLETE RTZ
 - 18 — LOST SPINDLE R.P.M.
 - 19 — NO CYL PULSES DETECTED
 - 20 — NO PICK CMND. DETECTED
 - 21 — NO START CMND. DET.
 - 22 — NO SEEK COMMAND DETECTED

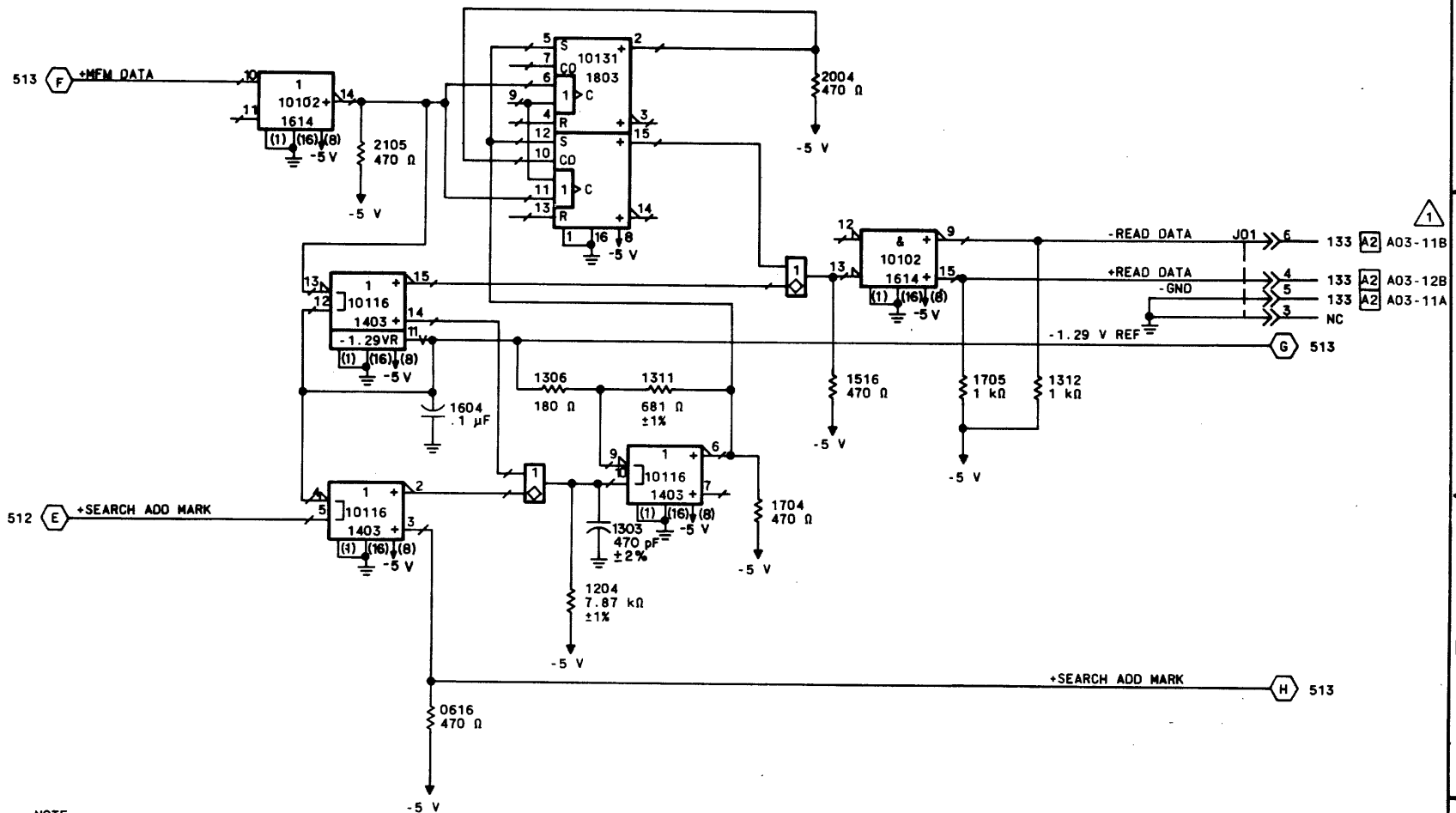
NOTE:
1 FAULT CODES NOT VALID WHEN UNIT ACCESSING.







NOTE:
 1 DELAY PRESET IN CARD TEST.



NOTE:

1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

MAGNETIC PERIPHERALS INC.
a subsidiary of
 CONTROL DATA CORPORATION

DIGITAL READ
 PART 3

NORMANDALE
 OPERATIONS

C

83323150

N

A

CODE IDENT
 19333

CROSS
 REF NO 514

SHEET 4

PAGE 3-160

LOC: A4 A1

REVISION STATUS OF SHEETS

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
A	A	A	A	A	A																
B	A	A	A	B	A																
C	C	A	B	A																	
D	D	D	D	D																	
E	D	D	E	D																	
F	F	D	E	D																	
G	F	G	E	D																	

.1 μF FILTER CAPS

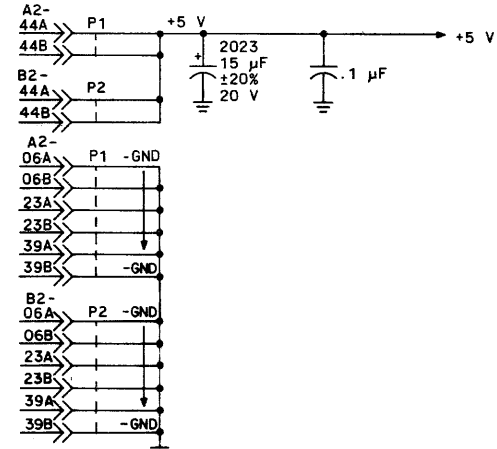
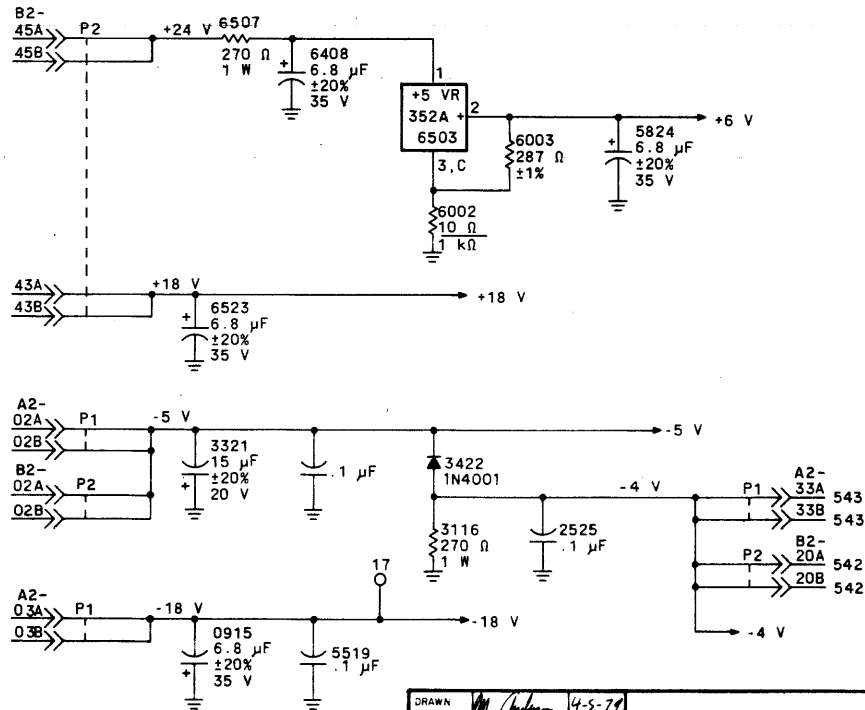
+5 V	-5 V
0415	1002
1511	1103
1910	1708
1912	
2314	

UNUSED LOGIC ELEMENTS

ELEMENT	LOCATION	OUTPUT PIN(S)
10131	5904	2, 3
10116	5916	6, 7, 14, 15

REVISIONS

REV	ECO.	DESCRIPTION	DRFT	DATE	CHK'D
A	PE23000	RELEASED			
B	PE49146	CORRECT LOGIC DIA	TH	7-25-79	
C	PE50685	CHANGE RESISTOR	CB	1-3-80	
D	PE50844	CHANGE TRANSISTORS	MF	7-1-80	
E	DJ02042	GNQN TO KNQN	DLM	9/30/81	
F	DJ02088	CORRECTIONS	DLM	9/30/81	
G	DJ02167	REPLACE CHIP AT 4716	DLM	9/30/81	



DRAWN	<i>M. Johnson</i>	4-5-79
CHECKED		
ENGINEER		
APPROVED		

MAGNETIC PERIPHERALS INC.
A member of
CONTECH DATA CORPORATION

WRITER AND SELECT
DIAGRAMS

TYPE:GNQN/KNQN

LOC: A4 A2/B2

NORMANDALE
OPERATIONS

C

83323150

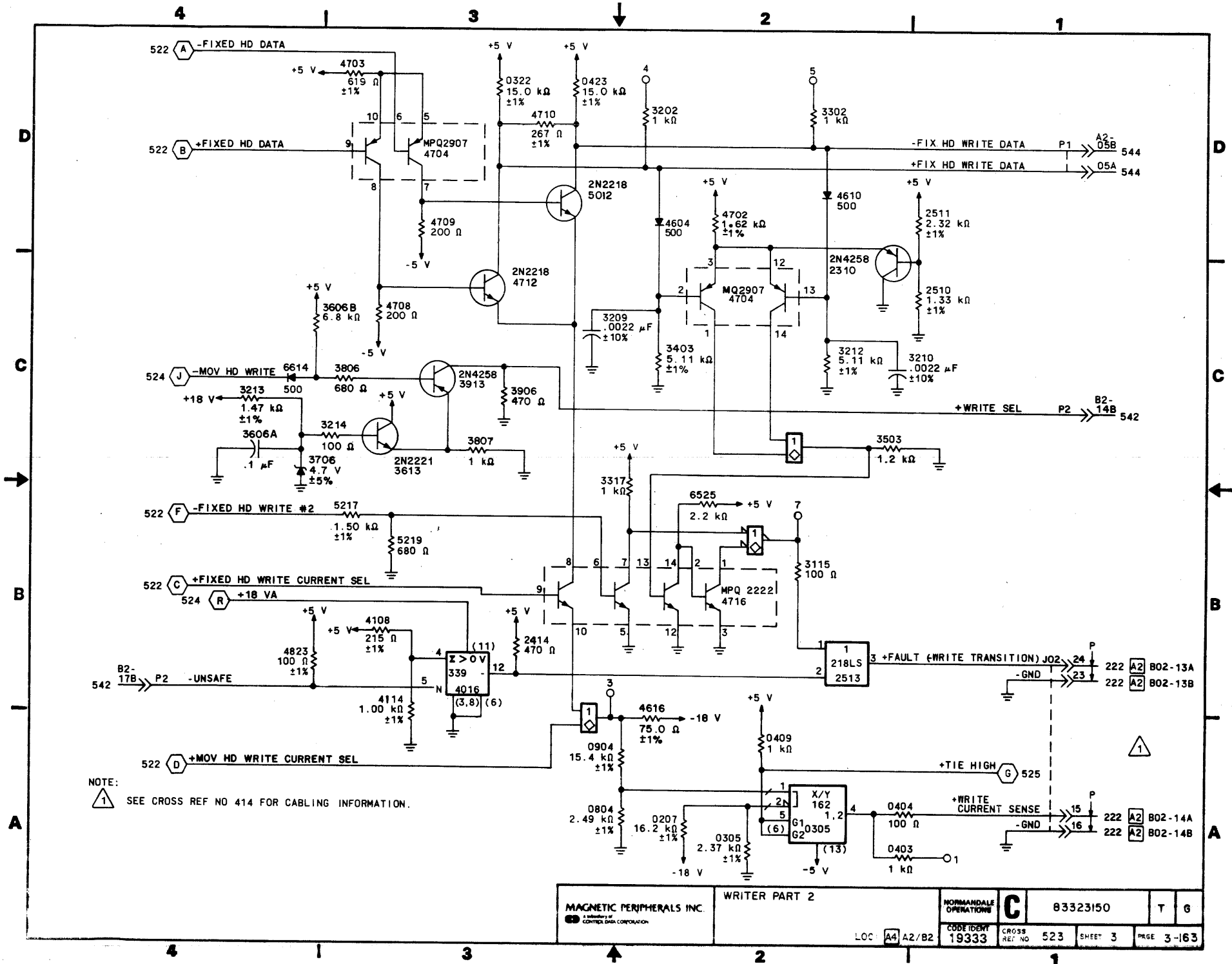
T G

CODE IDENT
19333

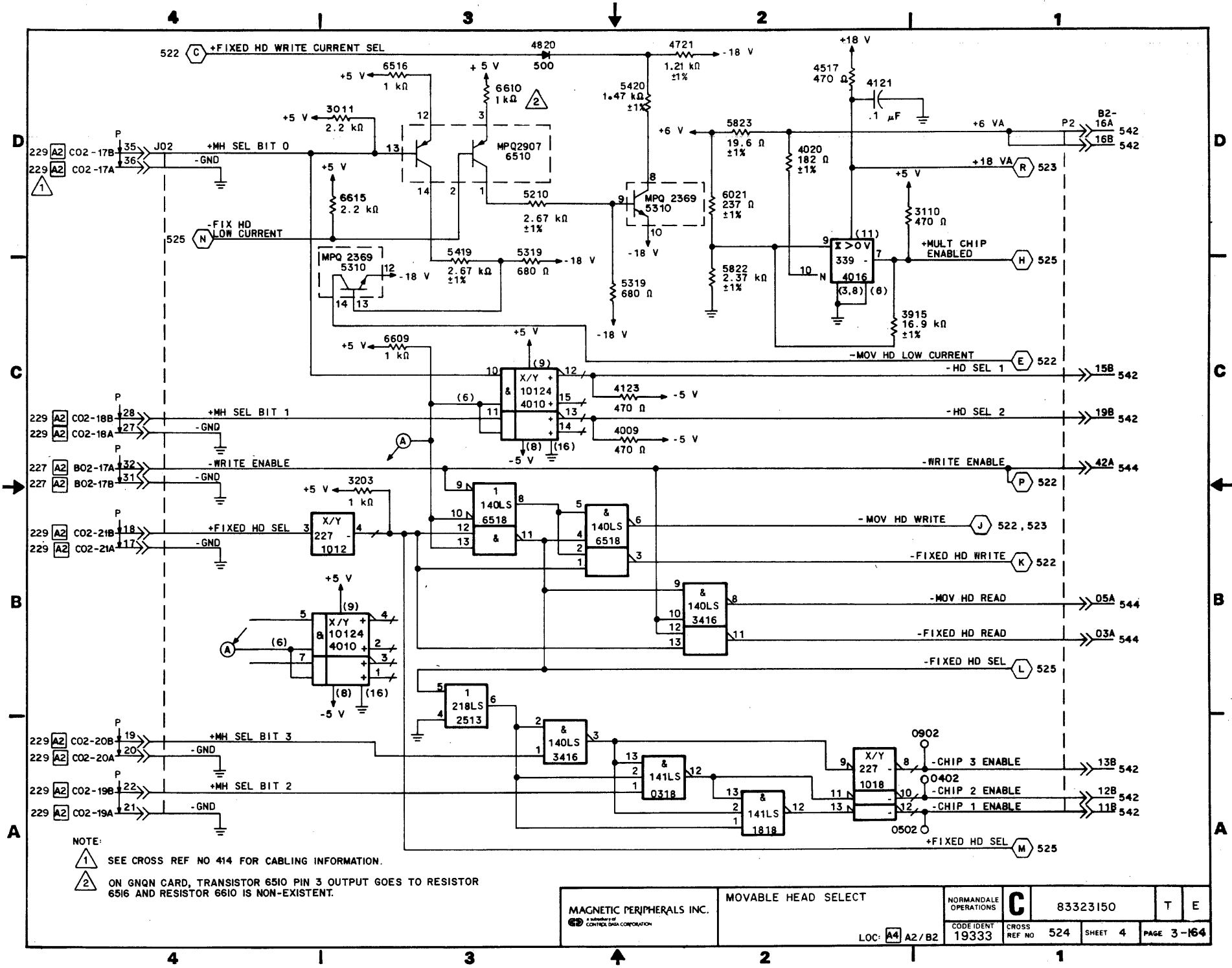
CROSS
REF: MC 521

SHEET
1 of 5

PAGE
3-161

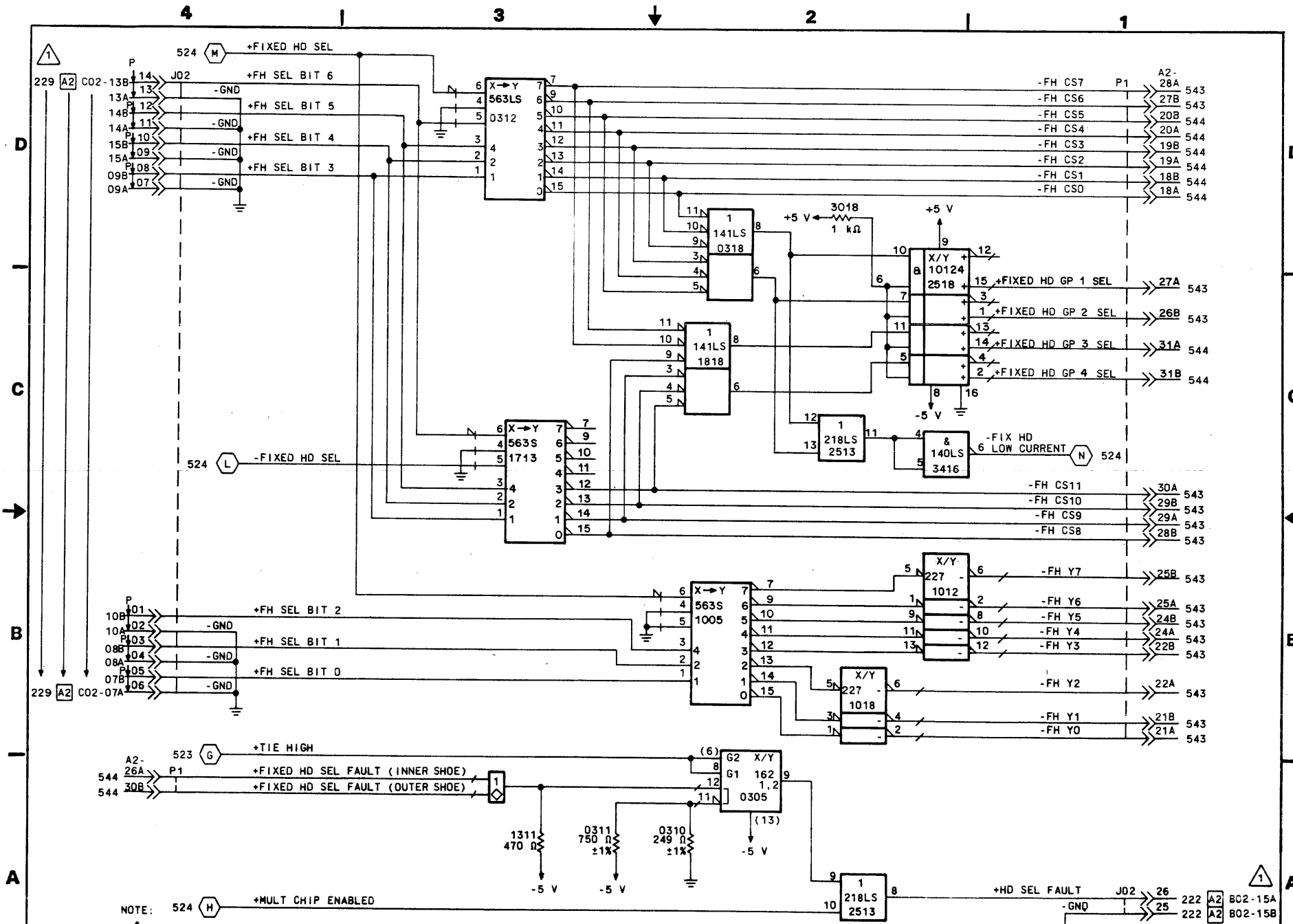


NOTE:
 ⚠ SEE CROSS REF NO 414 FOR CABLING INFORMATION.



NOTE:
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.
 2 ON GNQN CARD, TRANSISTOR 6510 PIN 3 OUTPUT GOES TO RESISTOR 6516 AND RESISTOR 6610 IS NON-EXISTENT.

MAGNETIC PERIPHERALS INC. <small>an IBM Company</small> <small>CONTROL DATA CORPORATION</small>	MOVABLE HEAD SELECT		NORMANDALE OPERATIONS C	83323150	T	E
	LOC: A4	A2/B2				



NOTE: 524 H +MULT CHIP ENABLED
 1 SEE CROSS REF NO 414 FOR CABLING INFORMATION.

REVISION STATUS OF SHEETS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
A	A	A	A																	
B	B	A	A																	
C	B	C	A																	

REVISIONS

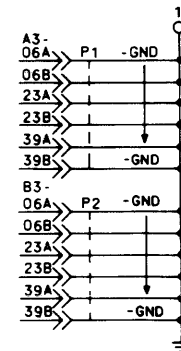
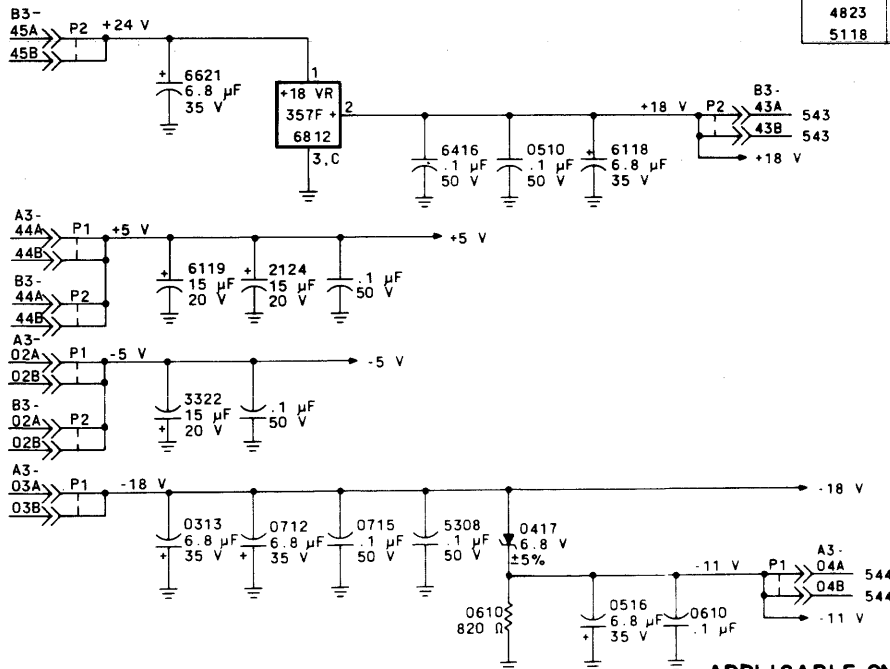
REV	ECC	DESCRIPTION	DRFT	DATE	CHK'D
A	PE23000	RELEASED			
B	PE49188	CHG RES A + 24 B	MF	11-17-80	
C	PE62277	DELETE CAPACITOR	MF	6-1-81	

UNUSED DIODE ARRAY

LOCATION	PINS
1718	5, 6, 7, 8, 9, 10, 11, 12

.1 μF FILTER CAPS

+5 V	-5 V
2023	4810
3419	4910
4823	6906
5118	



APPLICABLE ONLY TO BOMB UNITS WITH ENRN REV K AND BELOW.

DRAWN	M. L. ...	4-5-79
CHECKED		
EV. NEER		
APPROVED		

MAGNETIC PERIPHERALS INC.
A subsidiary of
CONTECH DATA CORPORATION

READ ANALOG
DIAGRAMS

TYPE: ENRN

NORMANDE
OPERATIONS

C

83323150

AC

C

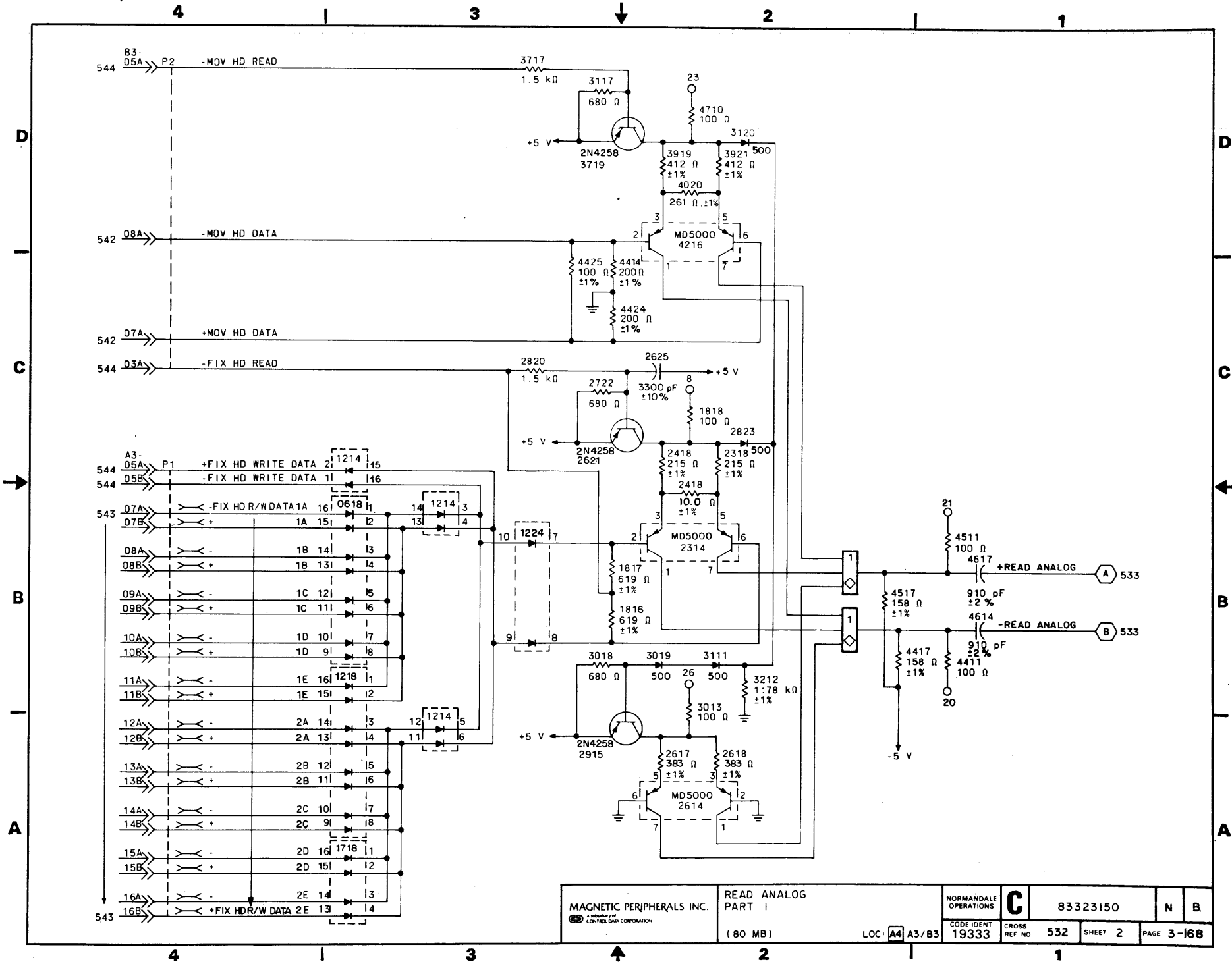
CODE IDENT
19333

PROSS
REF NO 531

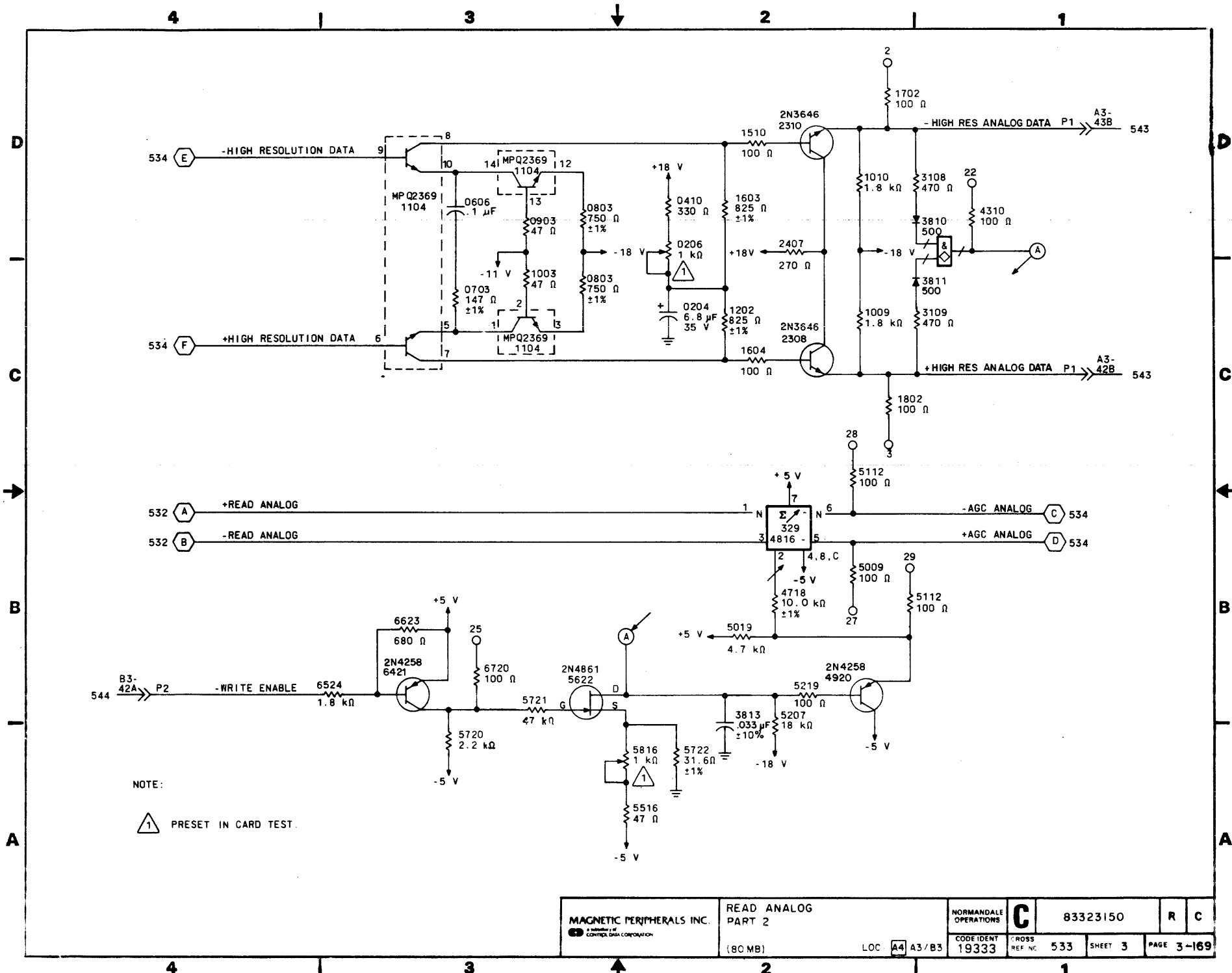
SHEET
1 OF 4

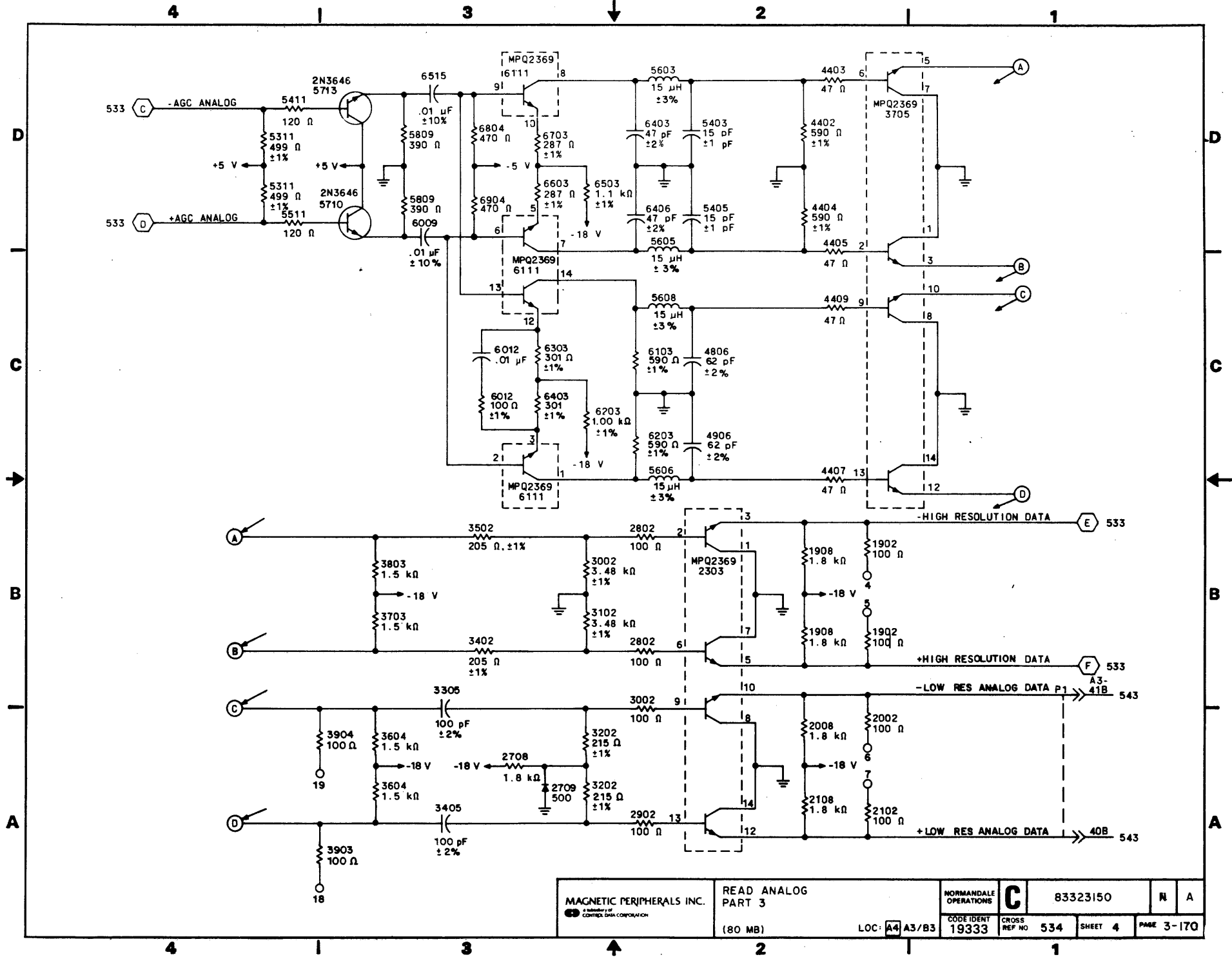
PAGE
3-167

LOC: A4/A3/B3



MAGNETIC PERIPHERALS INC. <small>A subsidiary of</small> CONTROL DATA CORPORATION	READ ANALOG PART I (80 MB)	NORMANDEALE OPERATIONS	C	83323150	N	B
	LOC: A4 A3/B3	CODE IDENT 19333	CROSS REF NO	532	SHEET 2	PAGE 3-168



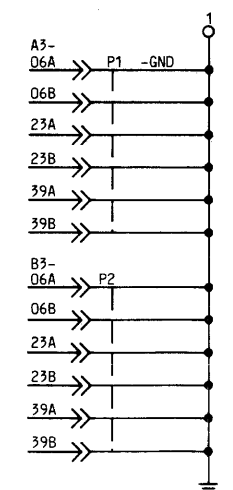
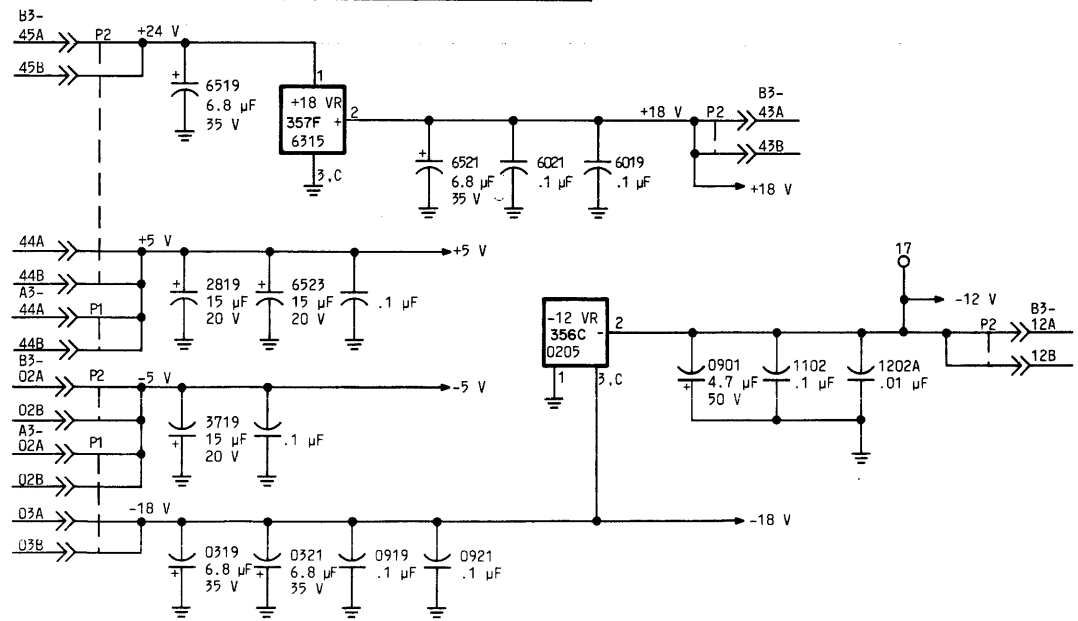


REVISION STATUS OF SHEETS																				
I	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
A	A	A	A																	
B	B																			
C																				
D		D																		
E	E	E	E																	
F	F	F	F																	

UNUSED DIODE PACK	
LOCATION	PIN(S)
0309	5,6,7,8

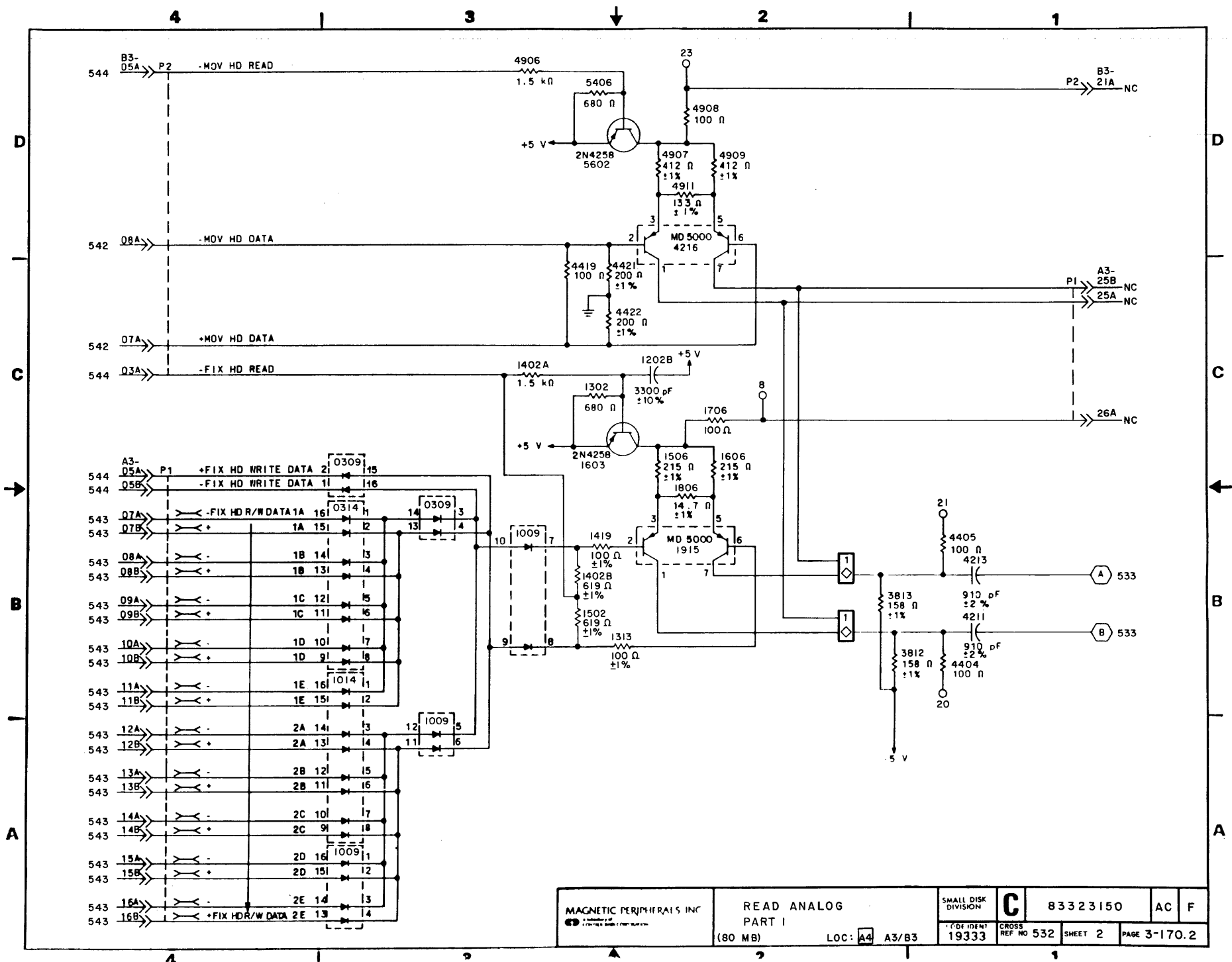
FILTER CAPACITOR	
+5 V	-5 V
2714	3821
2821	
3313	
5413	
6113	

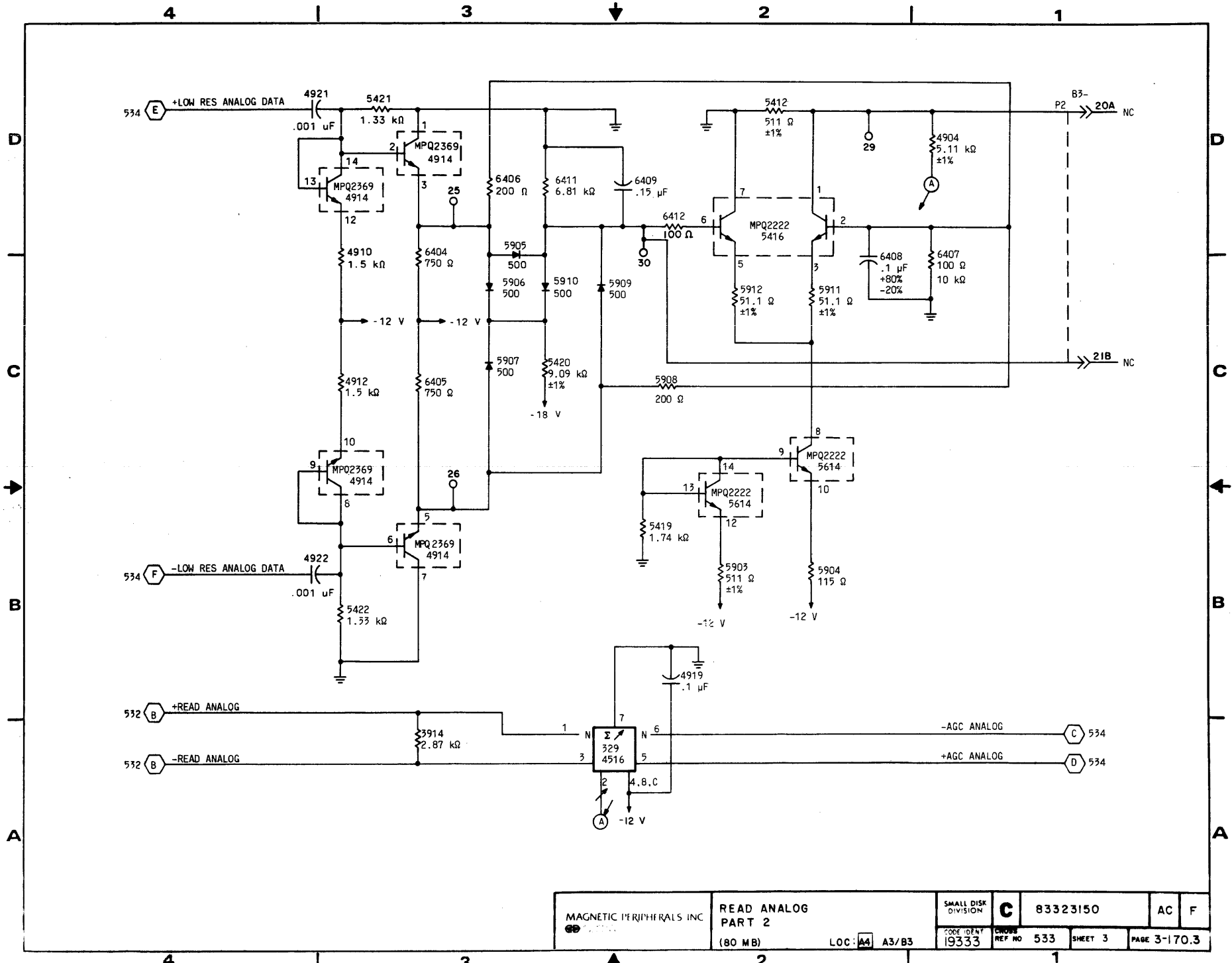
REVISIONS					
REV.	ECO.	DESCRIPTION	DRFT.	DATE	CHK'D
A	PE25000	RELEASED	M A	6-19-79	G R
B	PE49188	ENRN & ENRN RES CHG	T H	9-26-80	G R
C	PE21000	ADD IDD STICKER	M F	2-2-81	
D	PE62277	DELETE CAP	M F	4-7-81	D G D
E	DJ23000	TRANSFER FROM PE	S M S	5-17-82	C B
F	DJ02555	UPDATE LOGIC DIAGRAMS	M J	4-8-83	S C S

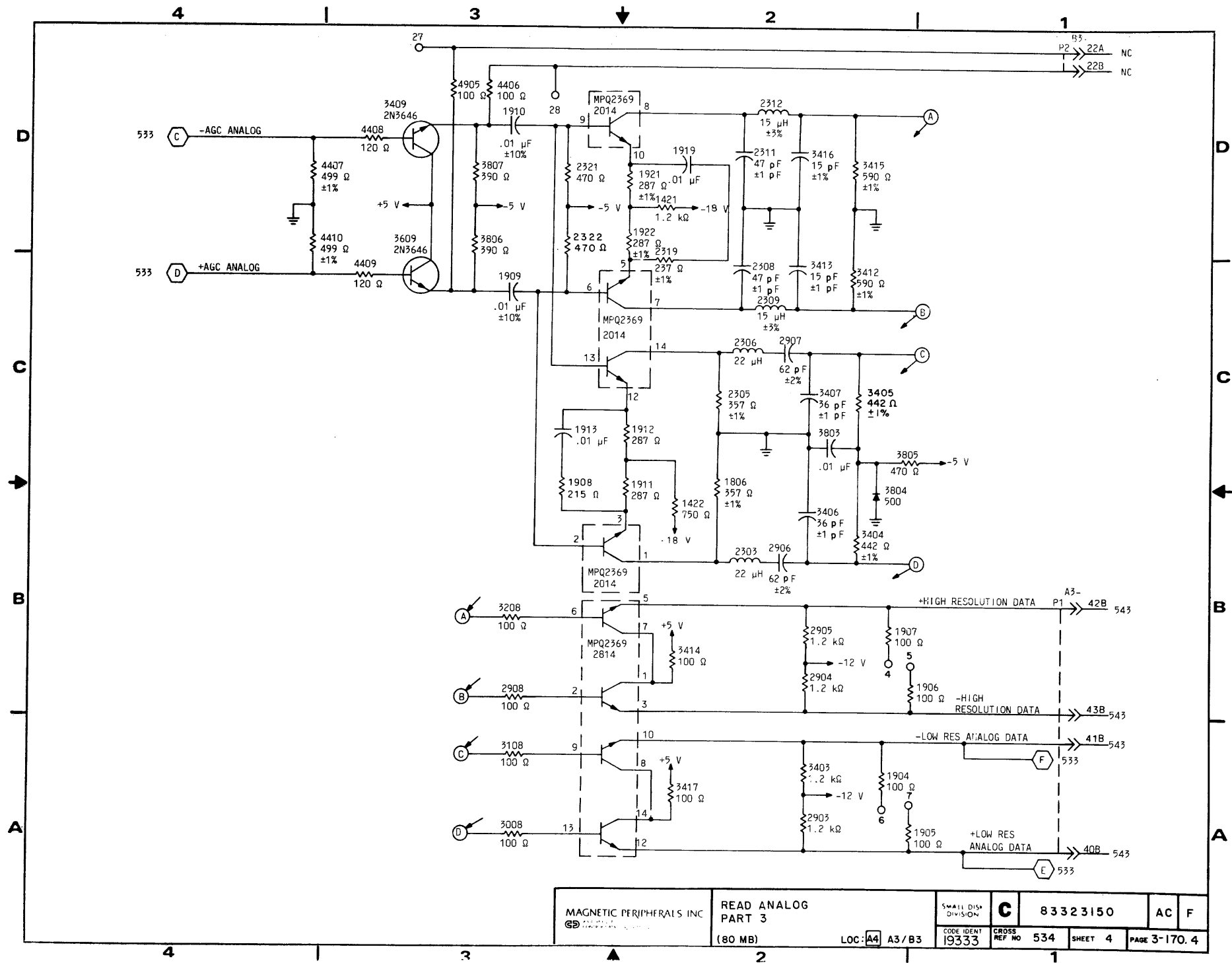


APPLICABLE ONLY TO 80MB UNITS WITH ENRN REV L & ABOVE.

DRAWN	William J. Ferguson	1-13-83	MAGNETIC PERIPHERALS INC. A DIVISION OF CENTRE DATA CORPORATION	LOGIC DIAGRAM READ ANALOG TYPE: ENRN	TWIN CITIES DISK DIVISION	C	83323150	AC	F	
CHECKED	DGD	1/14/83			CODE IDENT			CROSS REF NO	SHEET	PAGE
ENGINEER	William J. Ferguson	3/17/83			19333			531	1 of 4	3-170.1
APPROVED					LOC: A4 A3/B3					







MAGNETIC PERIPHERALS INC GD	READ ANALOG PART 3 (80 MB)	SMALL DISK DIVISION	C	83323150	AC	F
		CODE IDENT 19333			CROSS REF NO	534

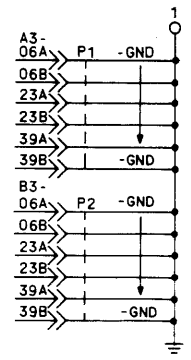
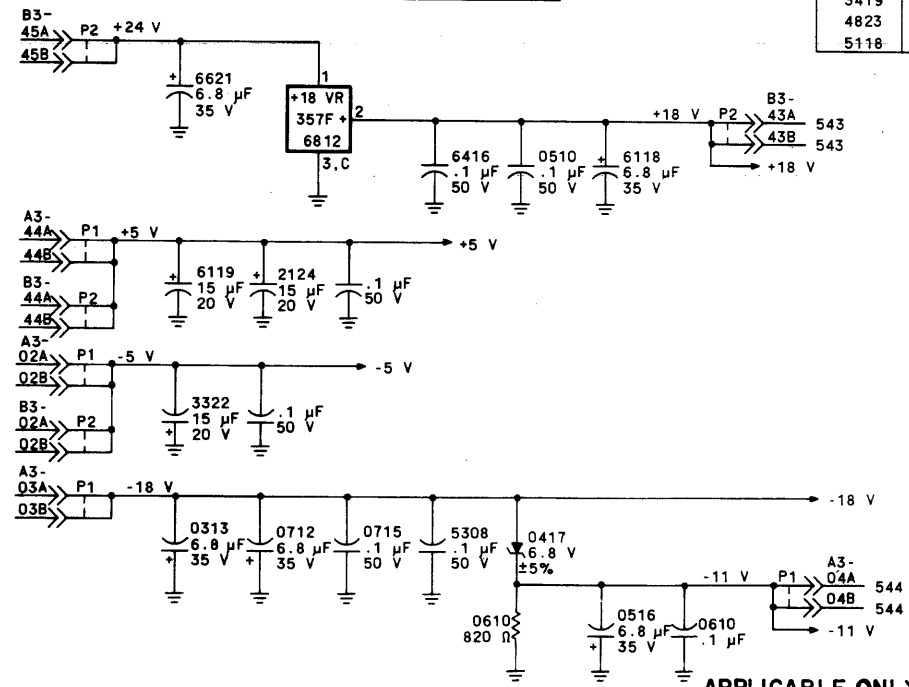
LOC: A4 A3/B3

REVISION STATUS OF SHEETS																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A																	
B	B	A	A																	
C	C	A	A																	
D	C	D	D																	
E	C	E	D																	

REVISIONS					
REV	ECO	DESCRIPTION	DRFT	DATE	CHK'D
A	PE23000	RELEASED			
B	PE50632	FNRN TO GNRN	TH	12-27-79	
C	PE49188	CHG RES AT 2418	MF	11-17-80	
D	PE62155	GNRN TO HNRN	MF	6-3-81	
E	PE62269	REMOVE CAPACITOR	MF	6-3-81	

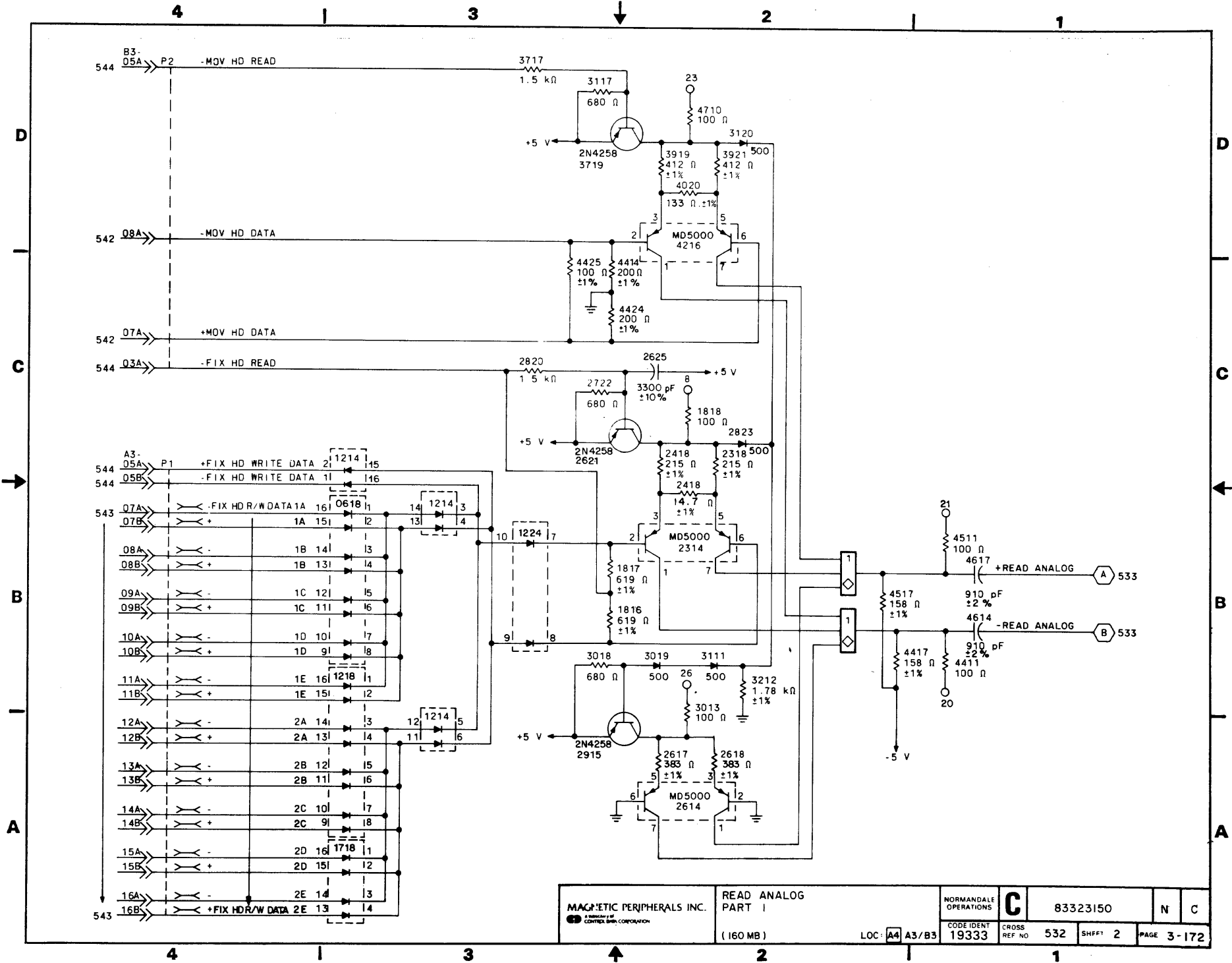
UNUSED DIODE ARRAY	
LOCATION	PINS
1718	5, 6, 7, 8, 9, 10, 11, 12

.1 μF FILTER CAPS	
+5 V	-5 V
2023	4810
3419	4910
4823	7006
5118	

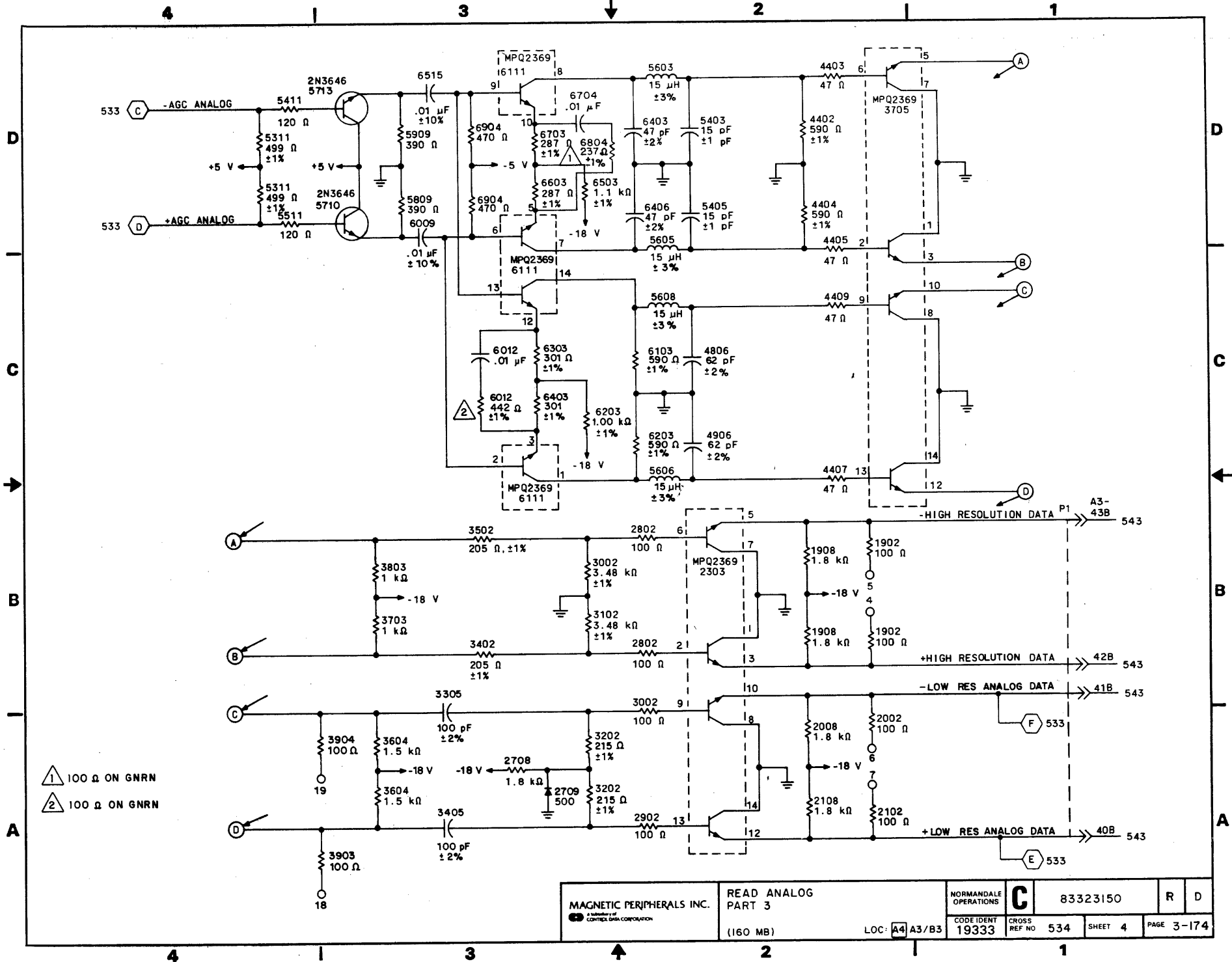


APPLICABLE ONLY TO I60MB UNITS WITH HNRN REV G & BELOW.

DRAWN <i>M. Anderson</i>	CHECKED <i>S.K. Johnson</i>	ENGINEER <i>S.K. Johnson</i>	APPROVED <i>S.K. Johnson</i>	DATE 4/19/79	MAGNETIC PERIPHERALS INC. A subsidiary of CONTROL DATA CORPORATION	READ ANALOG DIAGRAMS	NORMANDALE OPERATIONS C	83323150	AC E
TYPE: GNRN/HNRN				LOC: A4/A3/B3	CODE IDENT 19333	CROSS REF NO 531	SHEET of 4	PAGE 3-171	REF 75121619



MAGNETIC PERIPHERALS INC. <small>A DIVISION OF CONTROL DATA CORPORATION</small>	READ ANALOG PART 1 (160 MB)	NORMANDE OPERATIONS	C 83323150	N C
	LOC: A4 A3/B3	CODE IDENT 19333	CROSS REF NO 532	SHFT 2 PAGE 3-172



△ 1 100 Ω ON GMRN
 △ 2 100 Ω ON GMRN

MAGNETIC PERIPHERALS INC. <small>a subsidiary of</small> CONTROL DATA CORPORATION	READ ANALOG PART 3 (160 MB)	NORMANDALE OPERATIONS C	83323150	R	D
	LOC: A4 A3/B3	CODE IDENT 19333	CROSS REF NO 534	SHEET 4	PAGE 3-174

REVISION STATUS OF SHEETS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
A	A	A	A																	
B	B																			
C																				
D	D																			
E		E	E																	
F		F																		
G	G	G	G																	
H	H	H	H																	

UNUSED DIODE PACK

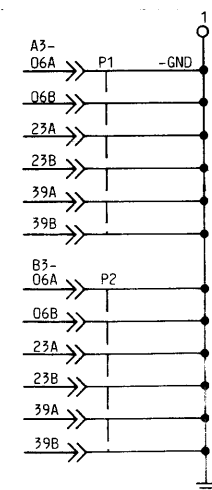
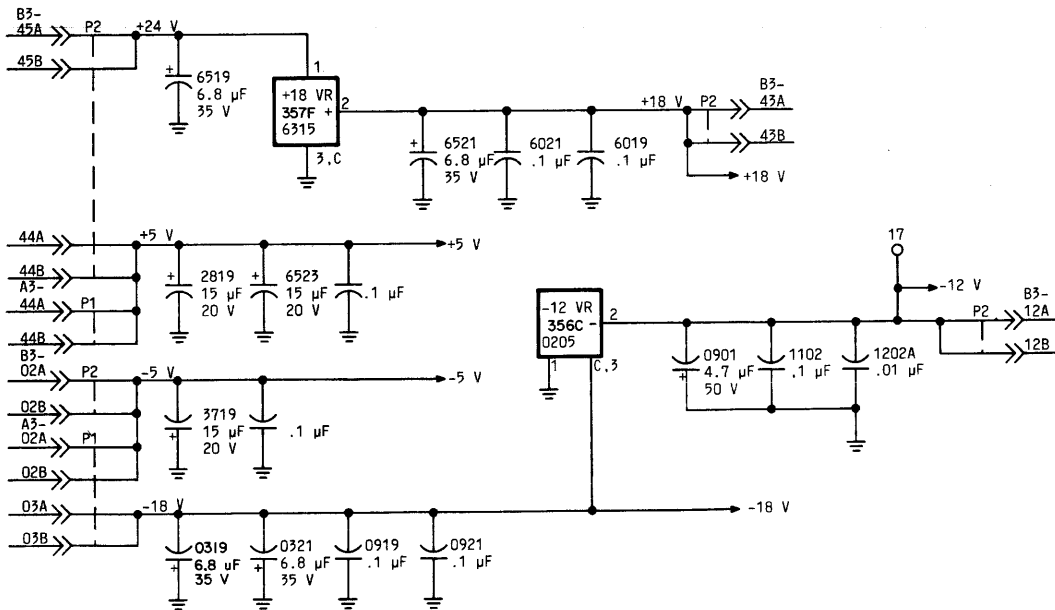
LOCATION	PIN(S)
0309	5,6,7,8

FILTER CAPACITOR

.1 μ F	
+5 V	-5 V
2714	3821
2821	
3313	
3413	
6113	

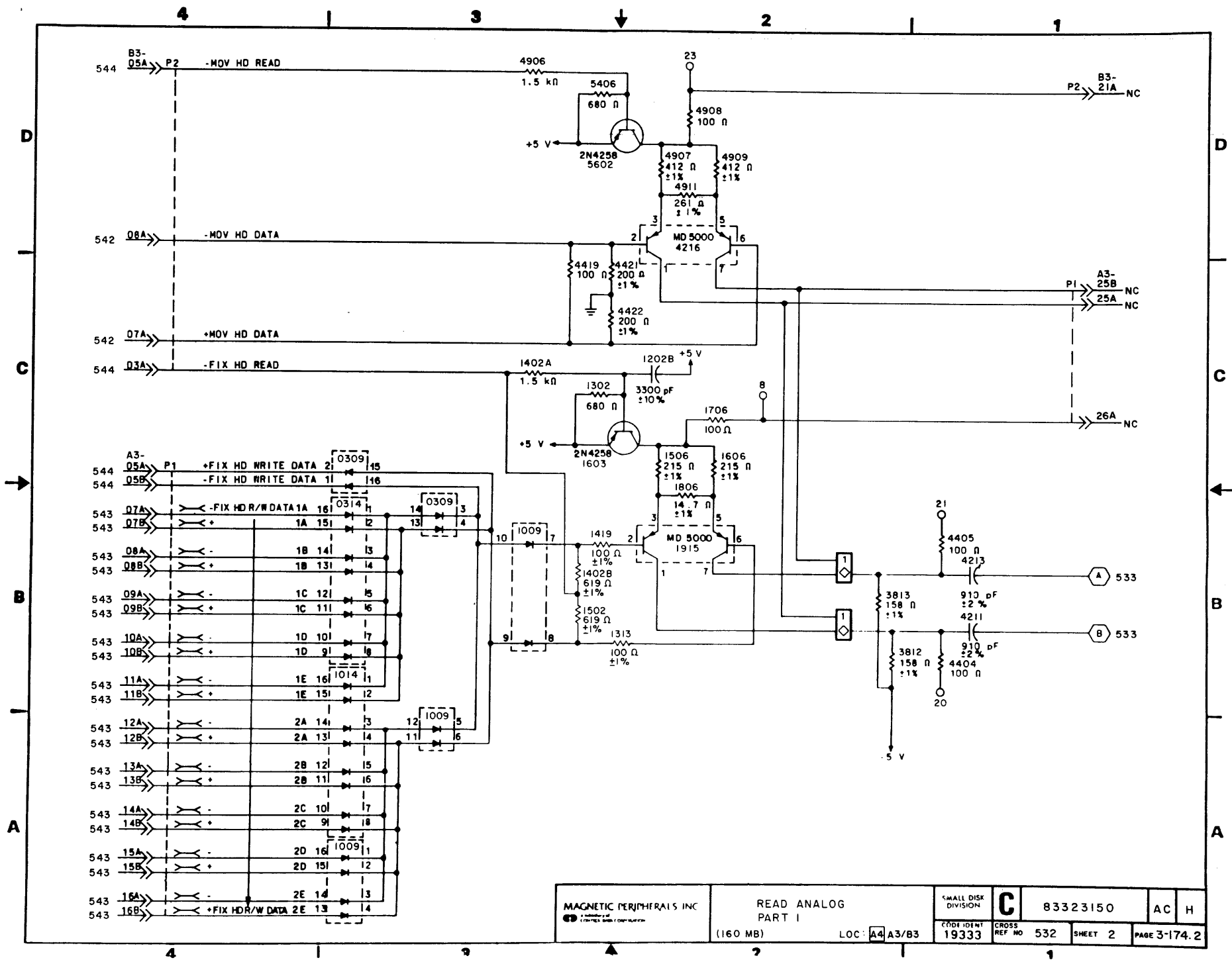
REVISIONS

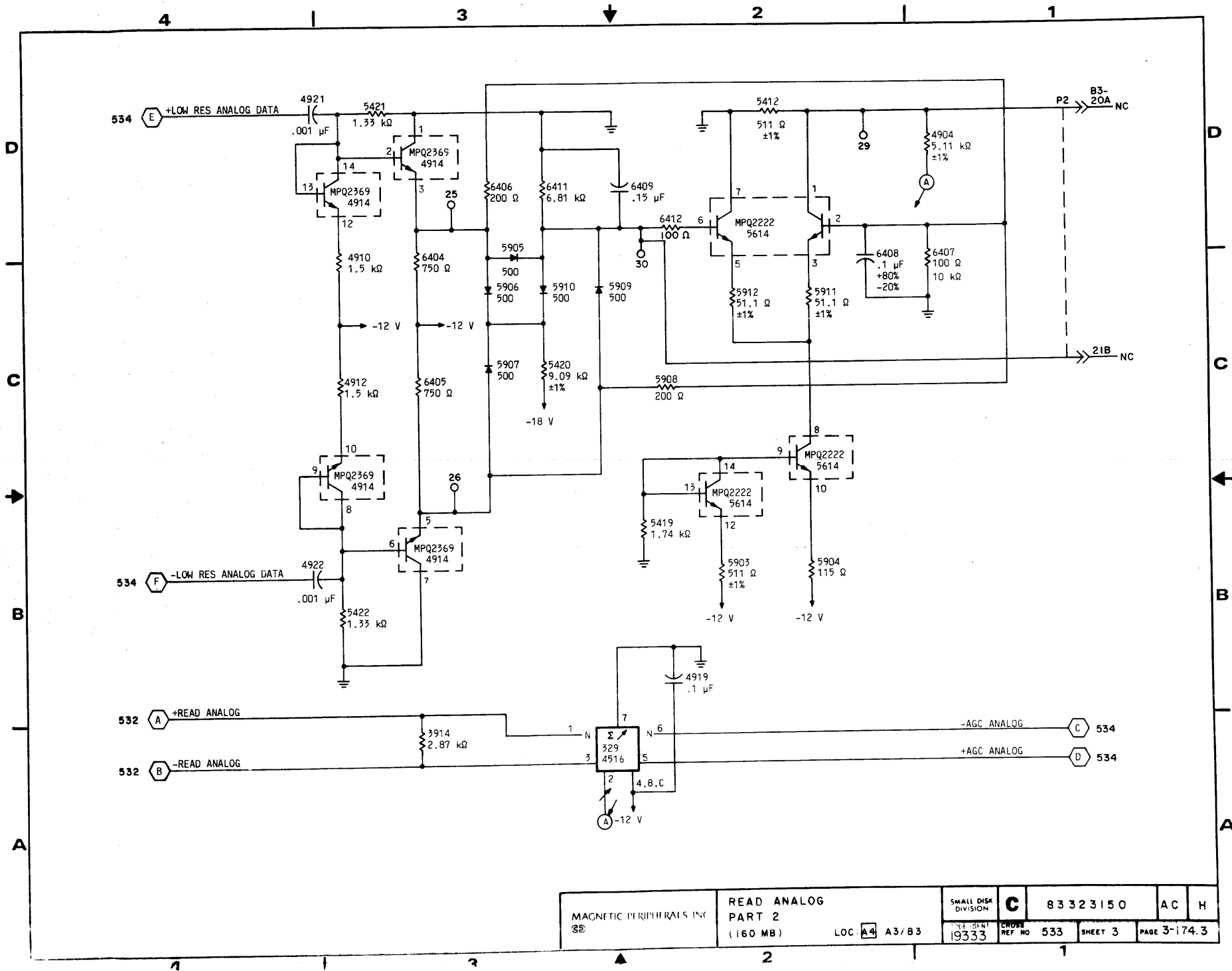
REV.	ECO.	DESCRIPTION	DRFT.	DATE	CHK'D
A	PE23000	RELEASED	MA	6-19-74	SK
B	PE50632	FNRN TO GNRN	TH	9-19-79	GR
C	PE50632B	FNRN TO GNRN	CB	2-25-80	GR
D	PE49188	GNRN & ENRN RES CHG	TH	9-26-80	GR
E	PE62155	GNRN TO HNRN	MF	12-16-80	
F	PE62269	DELETE CAP HNRN	MF	5-1-81	DGD
G	DJ22000	TRANSFER FROM PE	SMS	5-17-82	
H	DJ02555	UPDATE LOGIC DIAGRAMS	MJ	7-20-83	



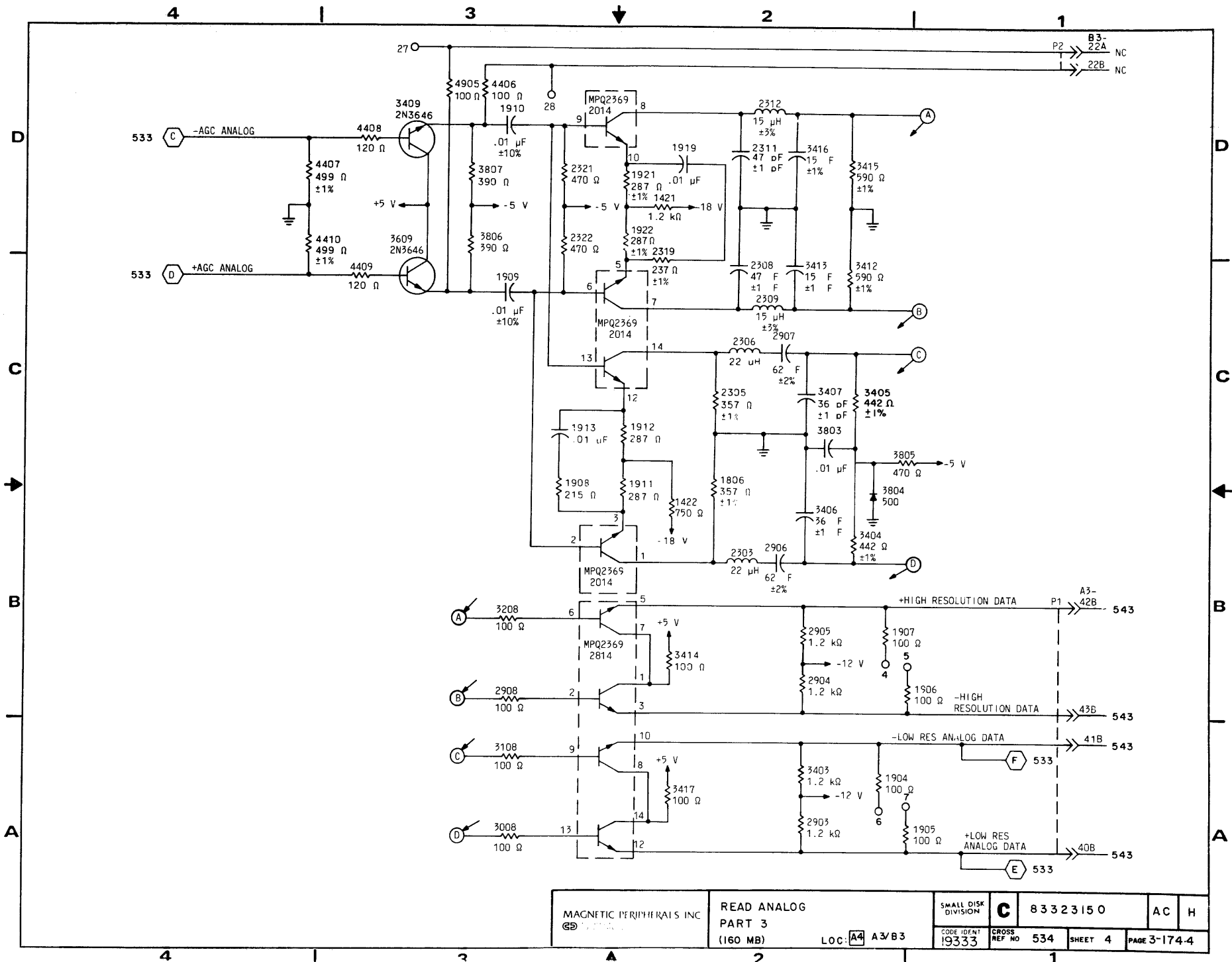
APPLICABLE ONLY TO 160MB UNITS WITH HNRN REV H & ABOVE.

DRAWN	John B. [Signature]	1-12-83	MAGNETIC PERIPHERALS INC. A MEMBER OF CONTRADATA CORPORATION	LOGIC DIAGRAM READ ANALOG TYPE: HNRN	TWIN CITIES DISK DIVISION	C	83323150	AC	H	
CHECKED	DG-D	1/19/83			CODE IDENT			CROSS REF NO	SHEET	PAGE
ENGINEER	[Signature]	3/1/83			19333			531	1 of 4	3-174.1
APPROVED					LOC A4A3/B3			REF NO		



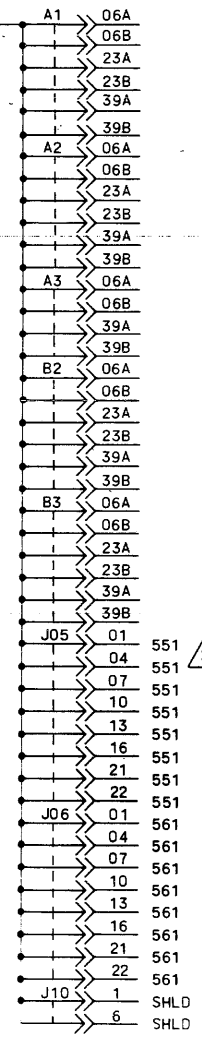
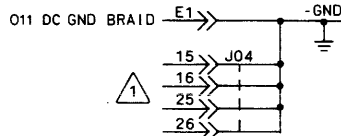


MAGNETIC PERIPHERALS INC GE	READ ANALOG PART 2 (160 MB)	LOC: A4 A3/B3	SMALL DISK DIVISION	C 83323150	AC	H
			DATE PRINT 19333	CROSS REF NO 533	SHEET 3	PAGE 3-174.3

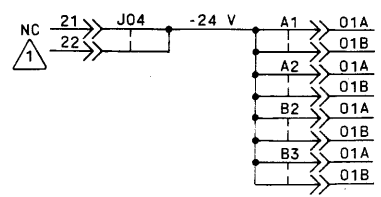
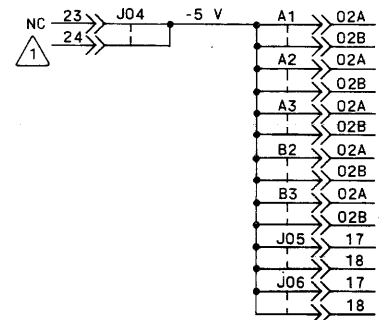
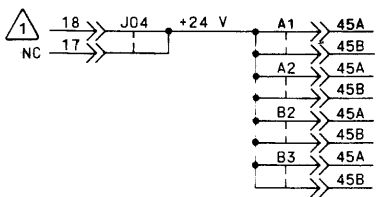
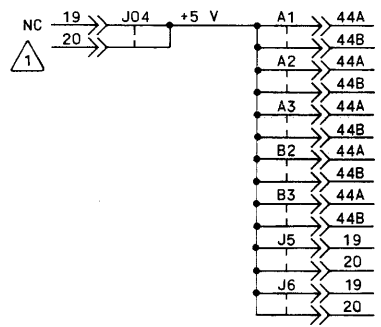


REVISION STATUS OF SHEETS

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A																
B	A	A	B																
C	A	C	B																



REVISIONS					
REV	ECD	DESCRIPTION	DRFT	DATE	CHK D
A	PE23000	RELEASED			
B	PE50705	CORRECTIONS	TH	12-27-79	
C	PE62165	CORRECTIONS	MF	12-81	



NOTES:
 1 POWER AND GROUND CABLED FROM BACKPANEL [A2] FASTONS. SEE CROSS REF NO 413 FOR CABLING INFORMATION.
 2 ALL J05 AND J06 OUTPUTS GO TO FIXED HD SHOES. (OPTIONS)

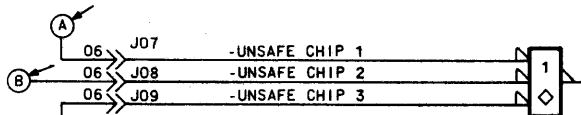
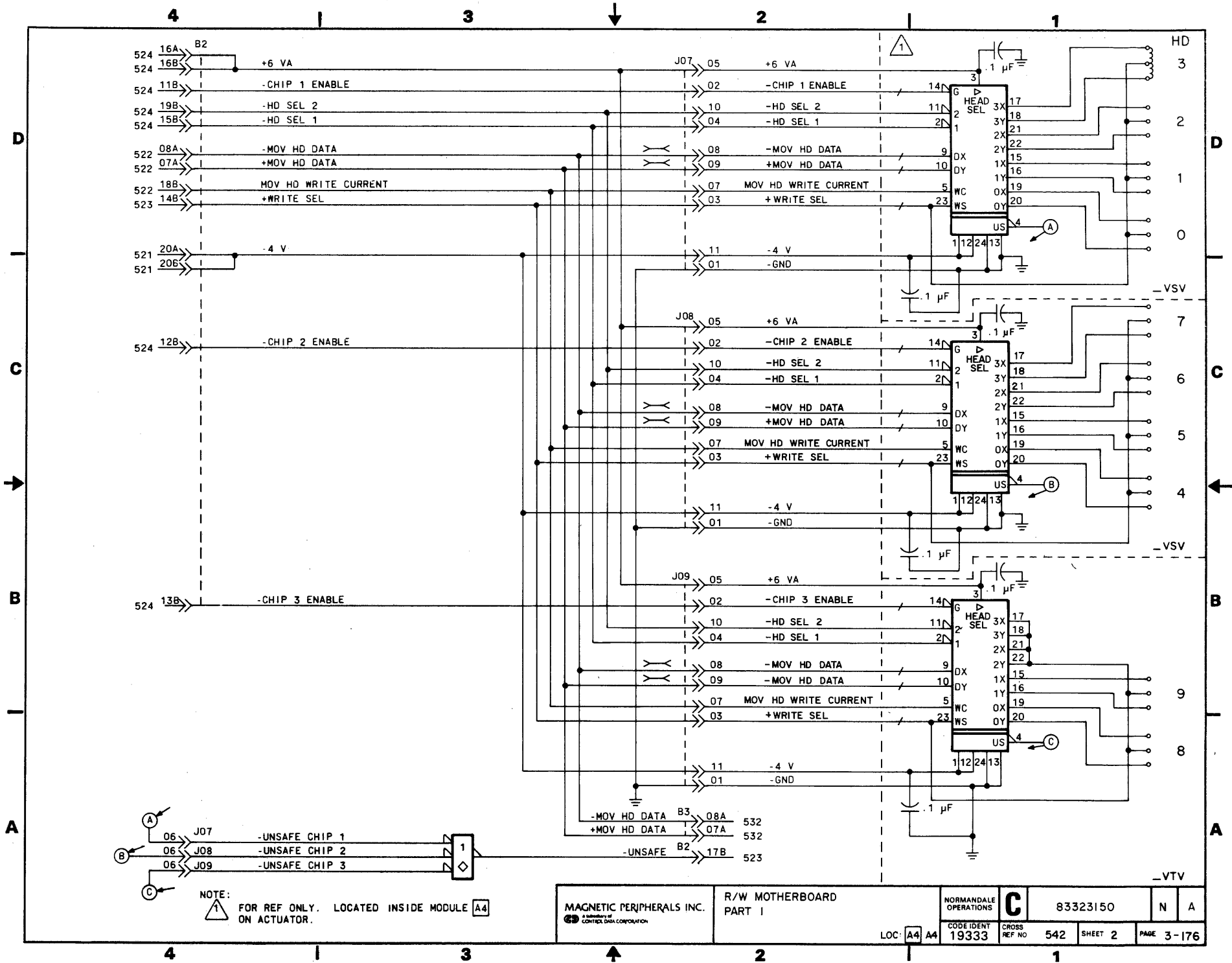
DESIGN	G. RABINE	4-4-79
CHECKED		
ENGINEER		
GROUP LEAD		

MAGNETIC PERIPHERALS INC.
 A subsidiary of
 CONTROL DATA CORPORATION

READ/WRITE MOTHERBOARD DIAGRAMS

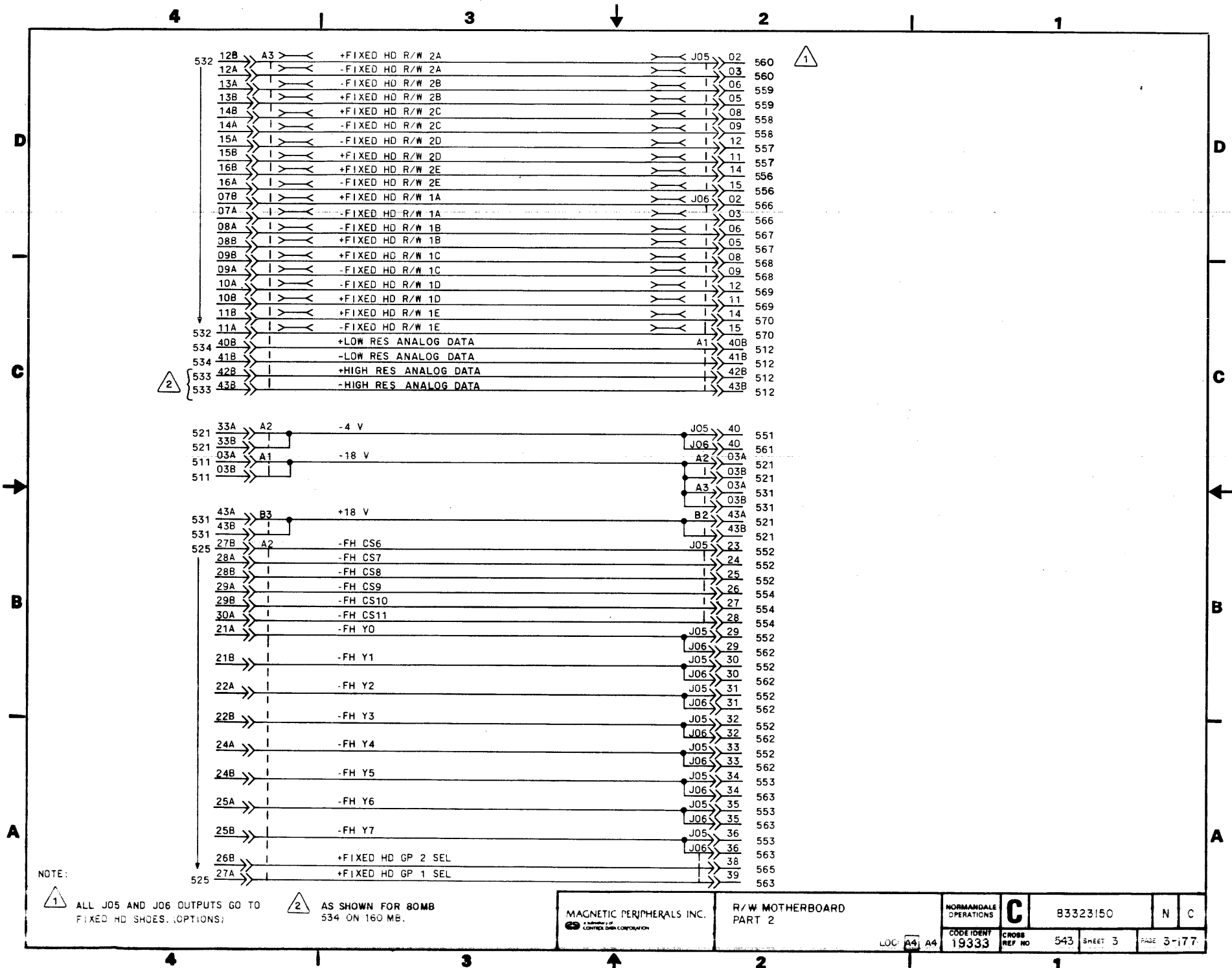
PERFORMANCE OPERATIONS	C	83323150	N	C
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TYPE: AWJN	LOC: A4 A4	PROJ IDENT: 19333	CROSS REF NO: 541	SHEET: 4	PAGE: 3-175
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NOTE: FOR REF ONLY. LOCATED INSIDE MODULE A4 ON ACTUATOR.

MAGNETIC PERIPHERALS INC. <small>a subsidiary of CENTREX DATA CORPORATION</small>	R/W MOTHERBOARD PART 1	NORMANDALE OPERATIONS C	83323150	N	A
LOC: A4 A4		CODE IDENT 19333	CROSS REF NO 542	SHEET 2	PAGE 3-176



NOTE:

1 ALL J05 AND J06 OUTPUTS GO TO
FIXED HD SHOES. (OPTIONS)

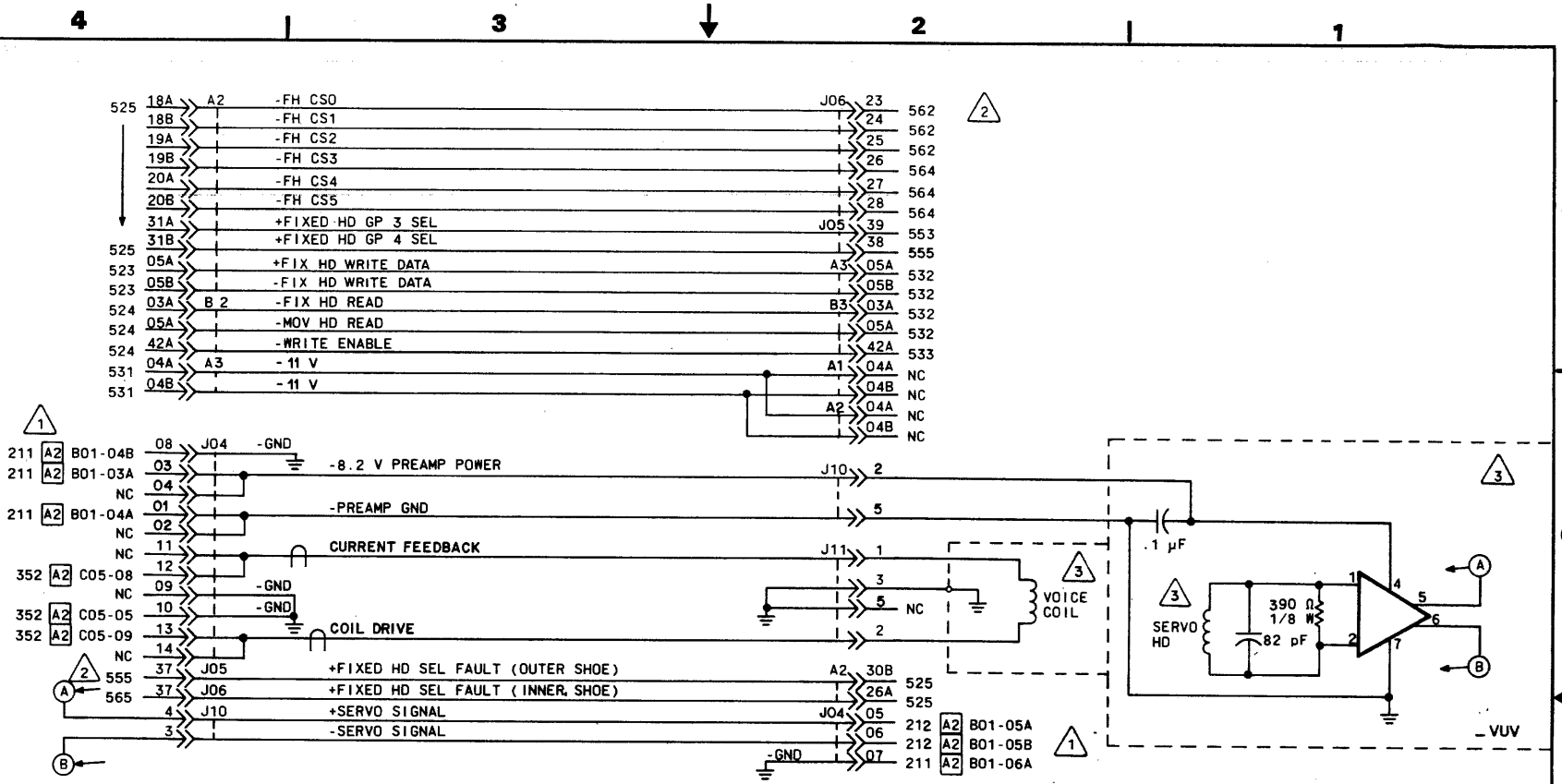
2 AS SHOWN FOR 80MB
534 ON 160 MB.

MAGNETIC PERIPHERALS INC.
A subsidiary of
CONTROL DATA CORPORATION

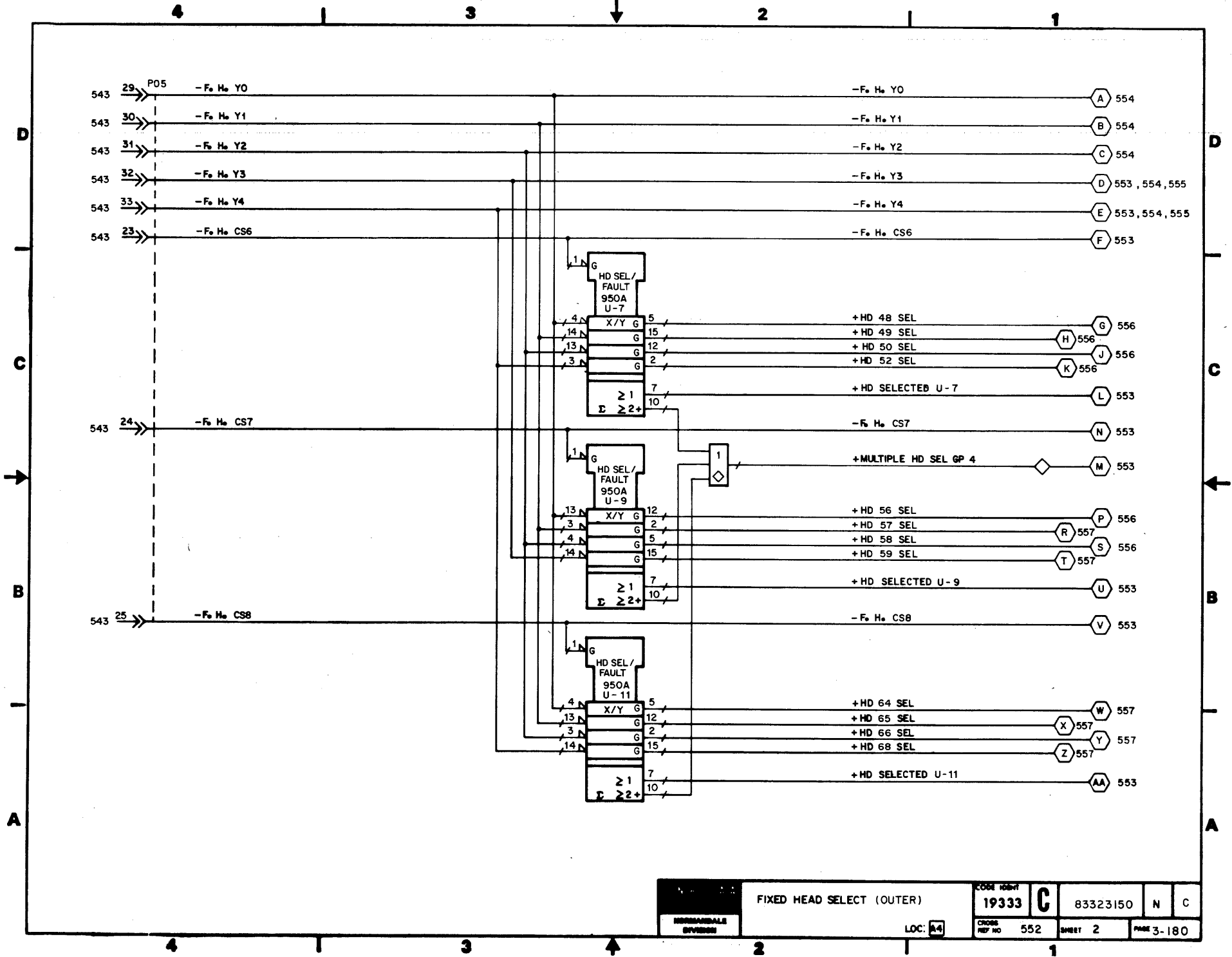
R/W MOTHERBOARD
PART 2

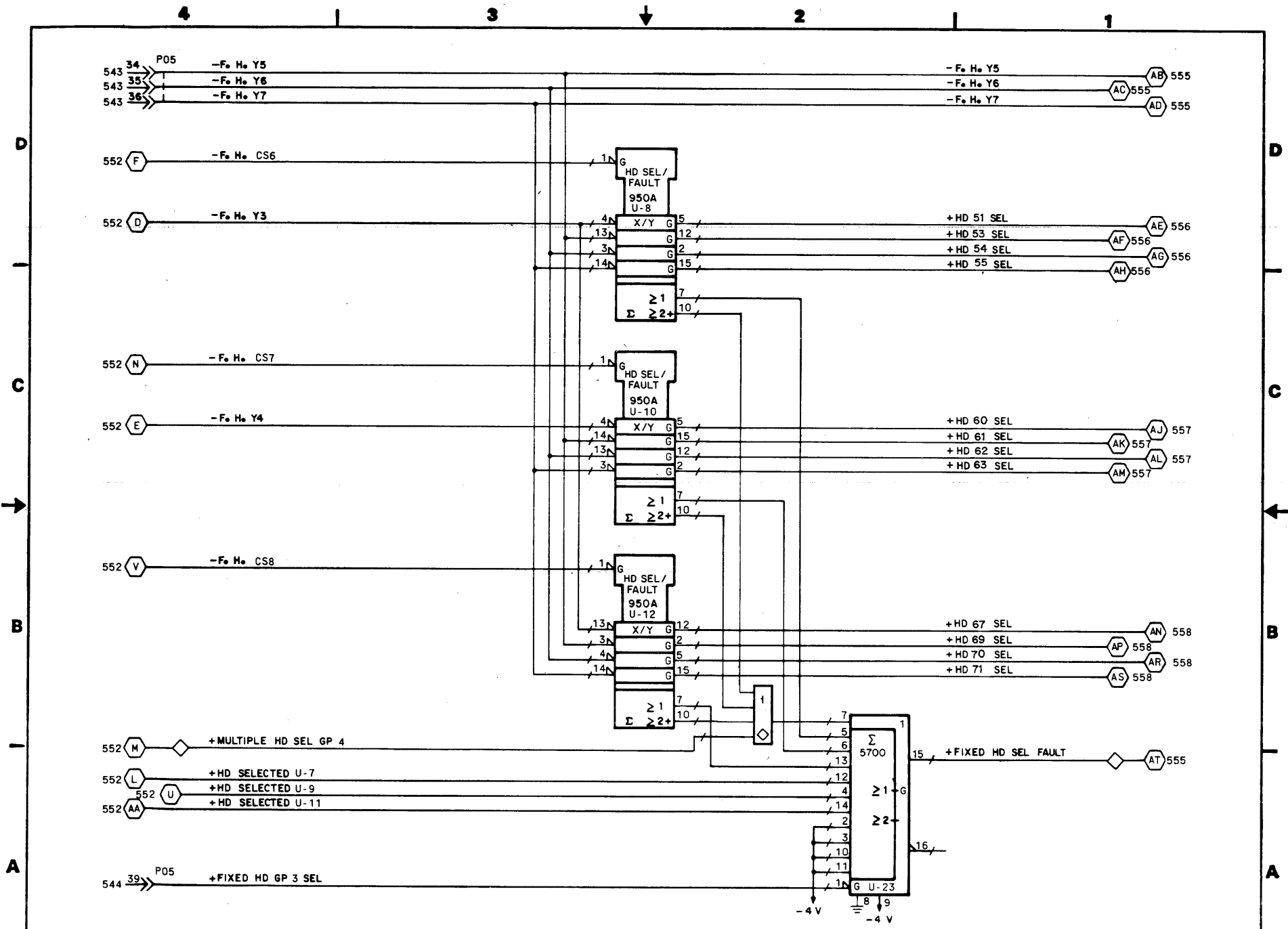
NORMANDALE OPERATIONS		C	83323150	N	C
CODE IDENT 19333	CROSS REF NO				

LOC: A4, A4

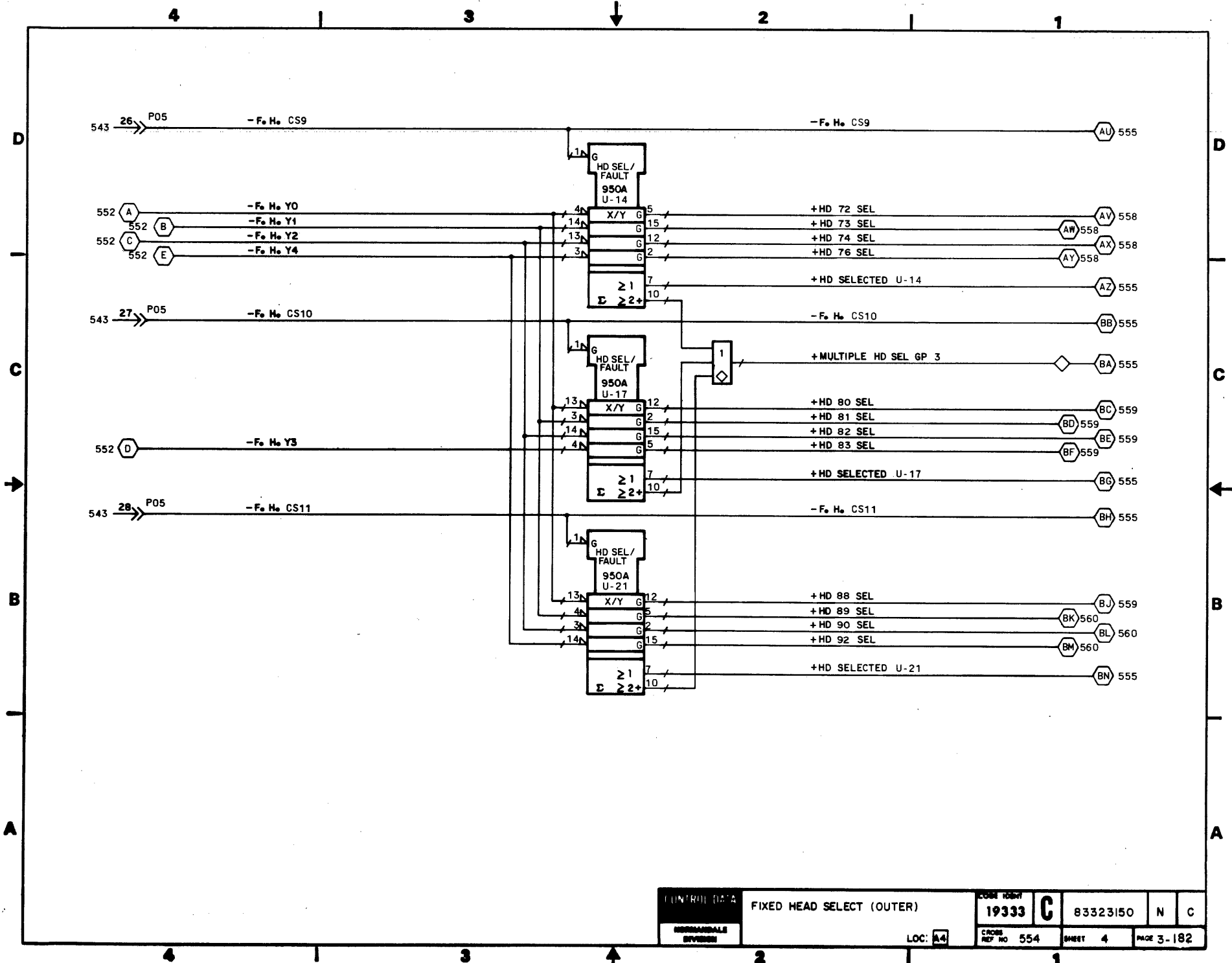


- NOTES:
- 1 SEE CROSS REF NO 413 AND 414 FOR CABLING INFORMATION.
 - 2 ALL J05 AND J06 OUTPUTS GO TO FIXED HD SHOES. (OPTIONS)
 - 3 FOR REF ONLY. LOCATED INSIDE MODULE A4 ON ACTUATOR.

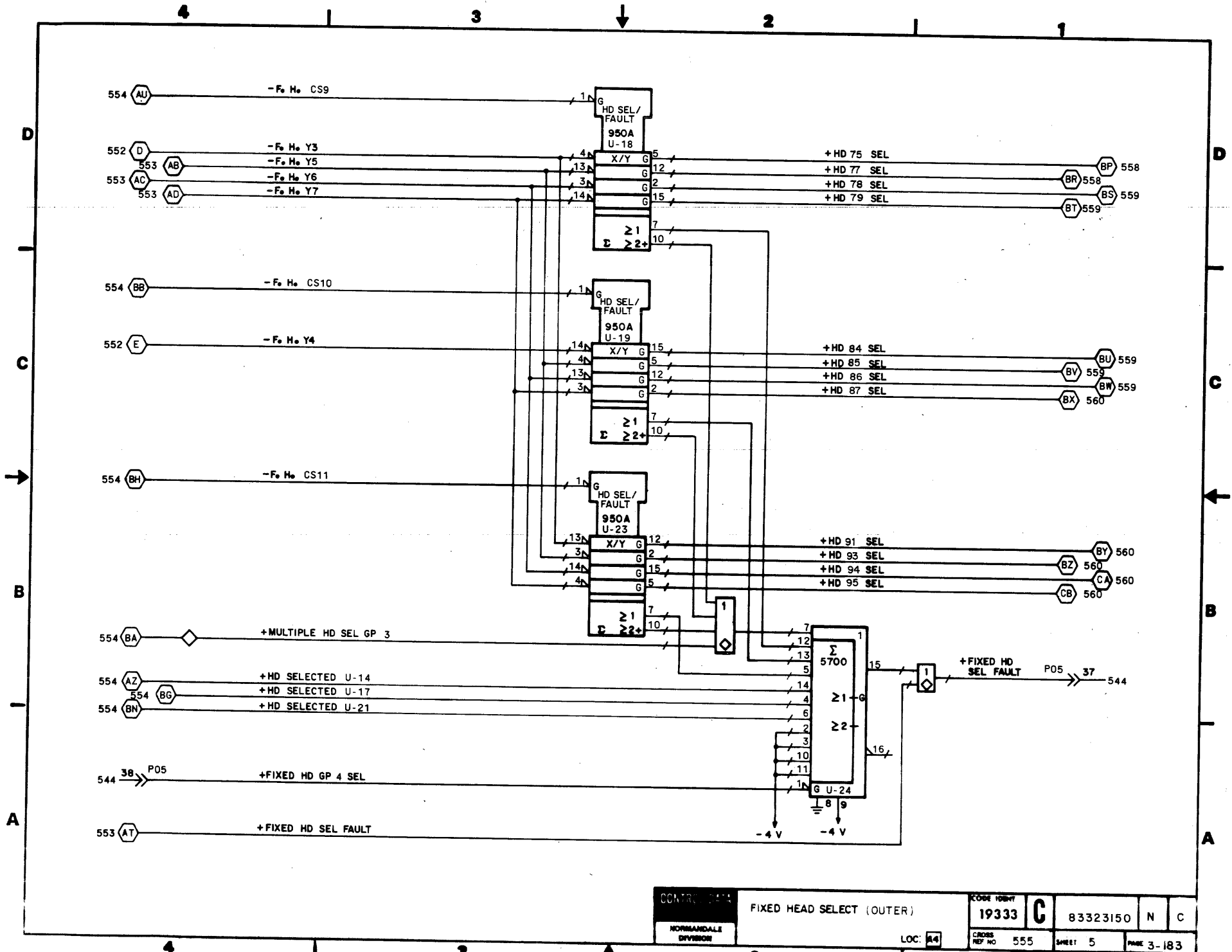




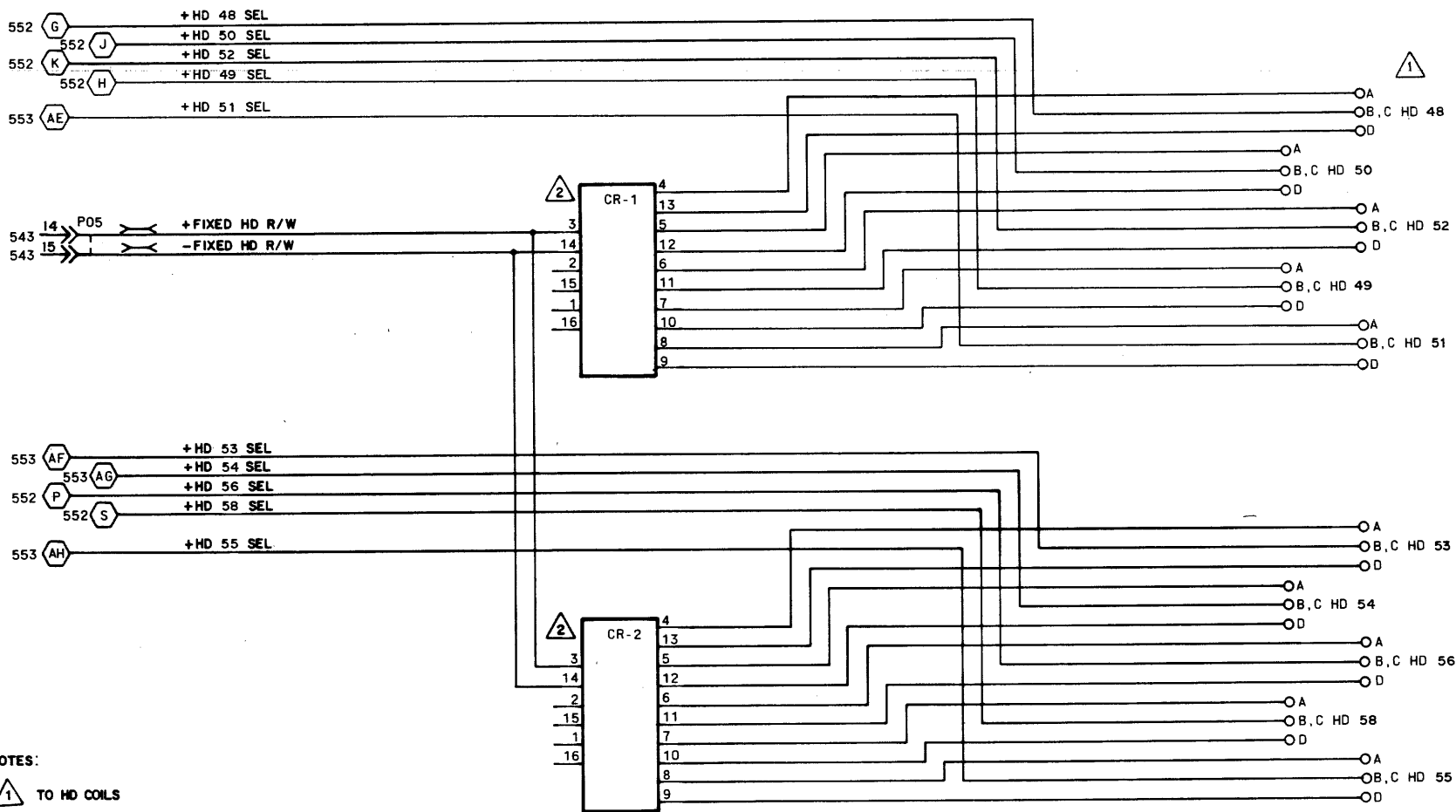
LOC: A4



CONTROL DATA	FIXED HEAD SELECT (OUTER)		CODE IDENT	C	83323150	N	C
	MANUAL DIVISION	LOC: A4	CROSS REF NO	554	SHEET	4	PAGE 3-182



CONTROL DATA NORBANDALE DIVISION	FIXED HEAD SELECT (OUTER)		CODE 19333	C	83323150	N	C
	LOC: A4		CROSS REF NO 555	SHEET 5	PAGE 3-183		

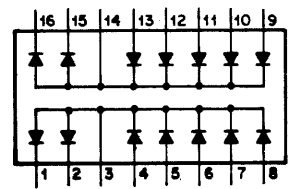


NOTES:

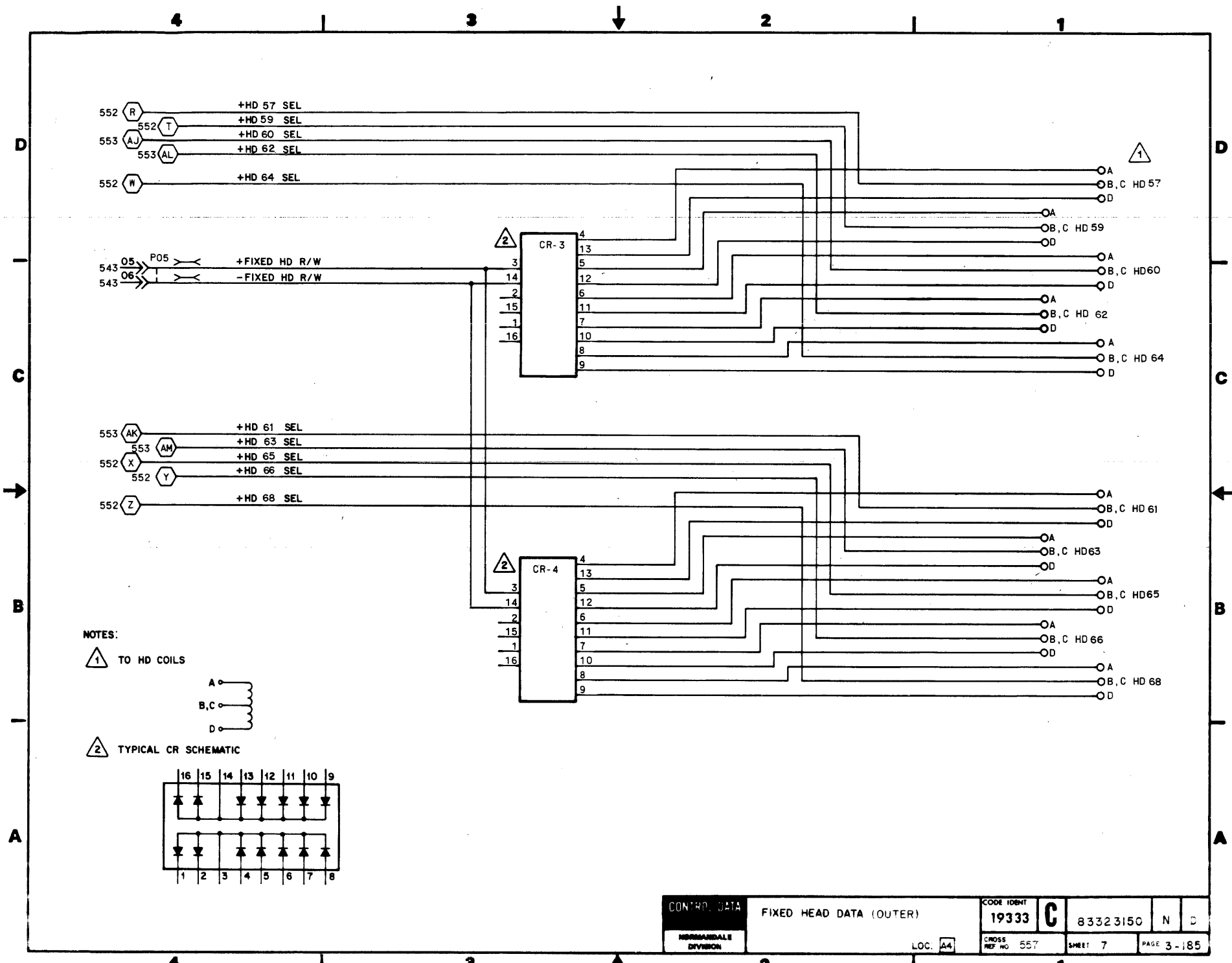
1 TO HD COILS



2 TYPICAL CR SCHEMATIC

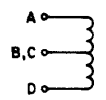


CONTROL DATA NORMANDALE DIVISION	FIXED HEAD DATA (OUTER)		CODE IDENT 19333	C	83323150	N	D
	LOC: A4		CROSS REF NO 556	SHEET 6	PAGE 3-184		

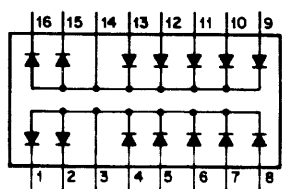


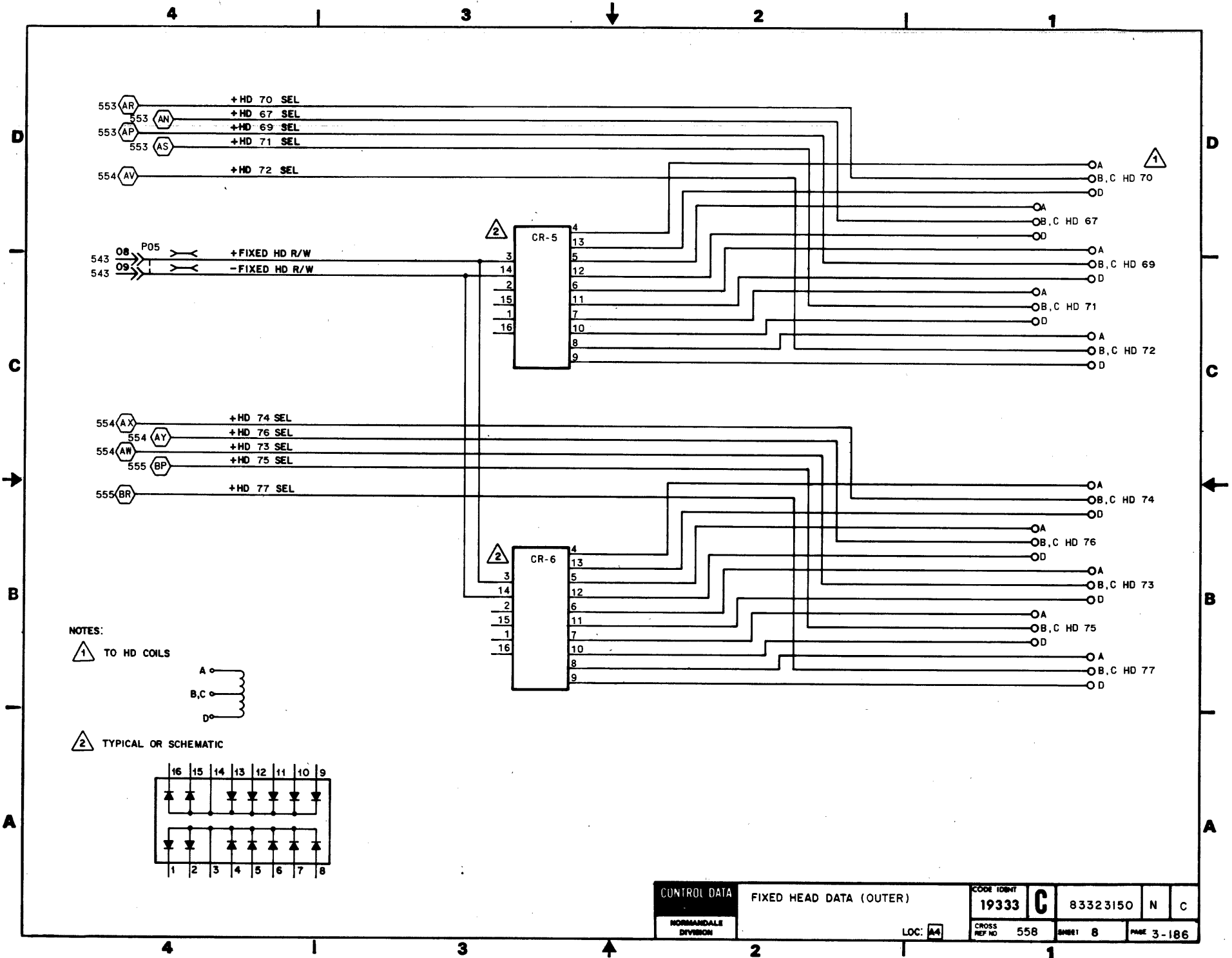
NOTES:

△ 1 TO HD COILS



△ 2 TYPICAL CR SCHEMATIC



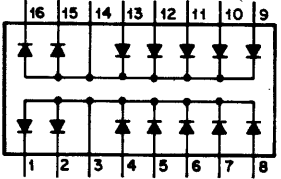


NOTES:

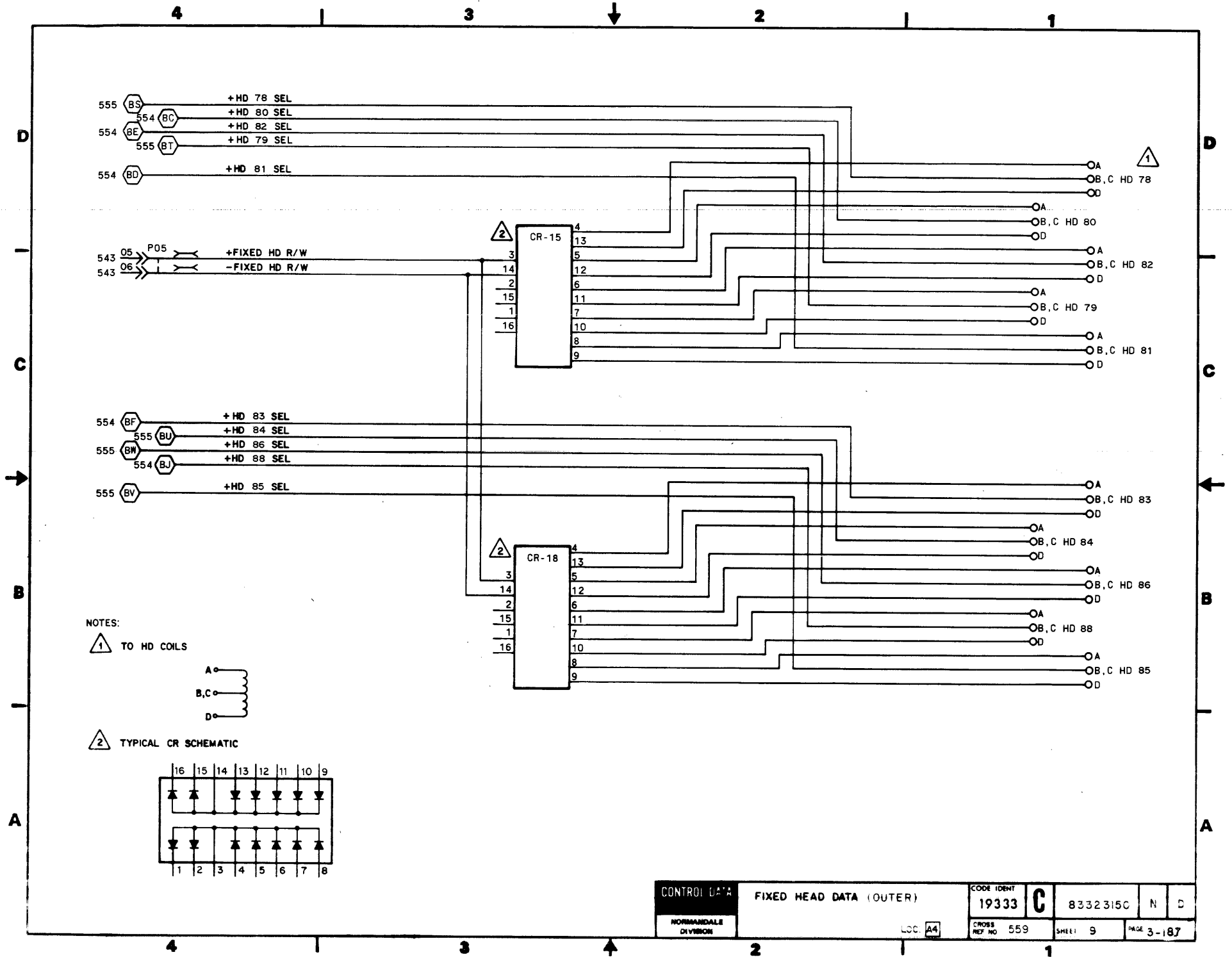
△ TO HD COILS

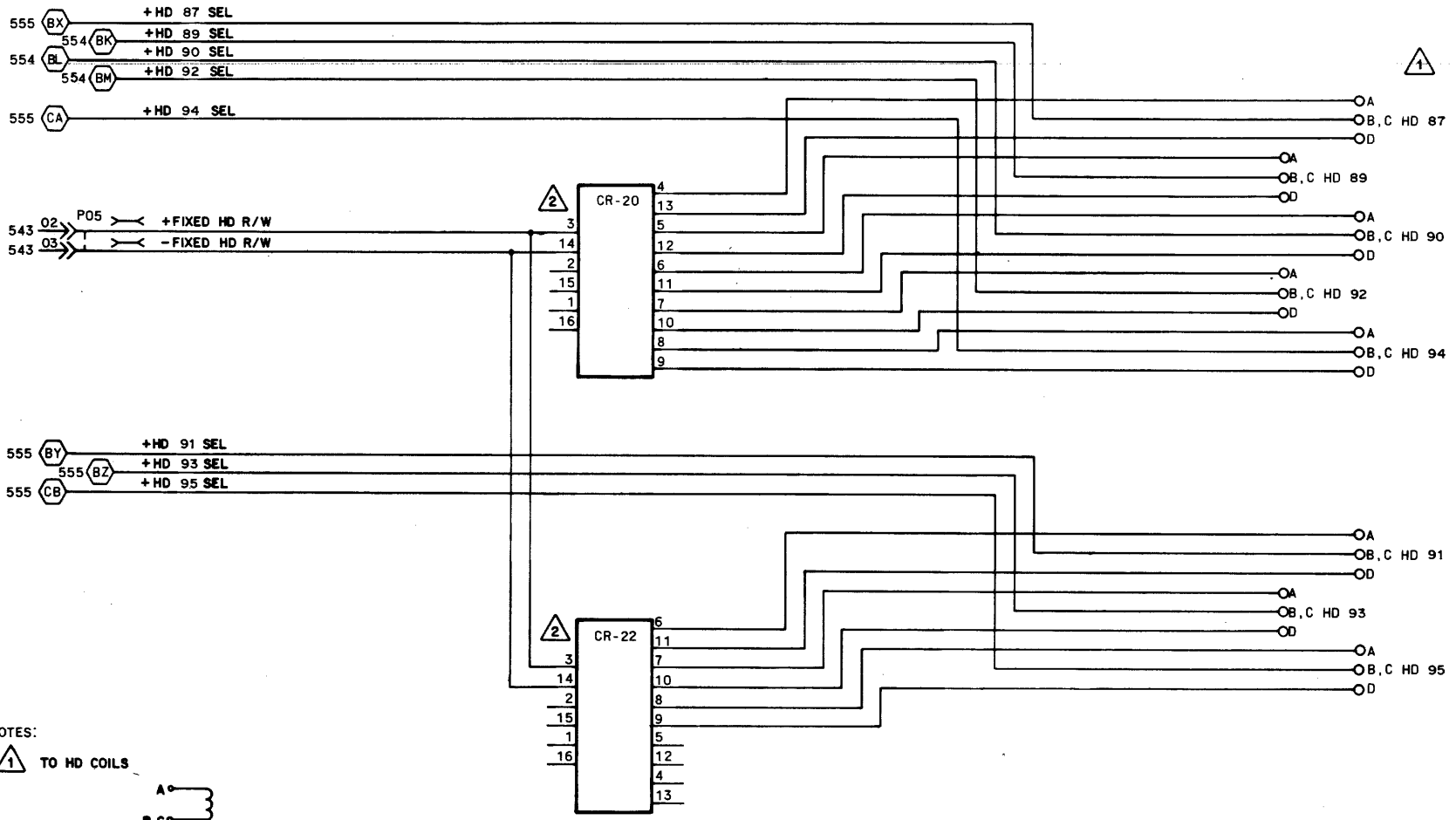


△ TYPICAL OR SCHEMATIC

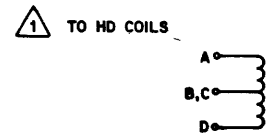


CONTROL DATA NORMANDEALE DIVISION	FIXED HEAD DATA (OUTER)	CODE IDENT	C	83323150	N	C
		19333				
LOC: A4		CROSS REF NO	558	ENGR 8	PAGE 3-186	

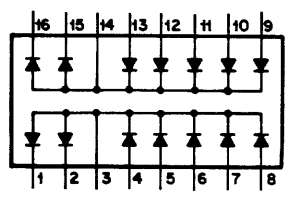




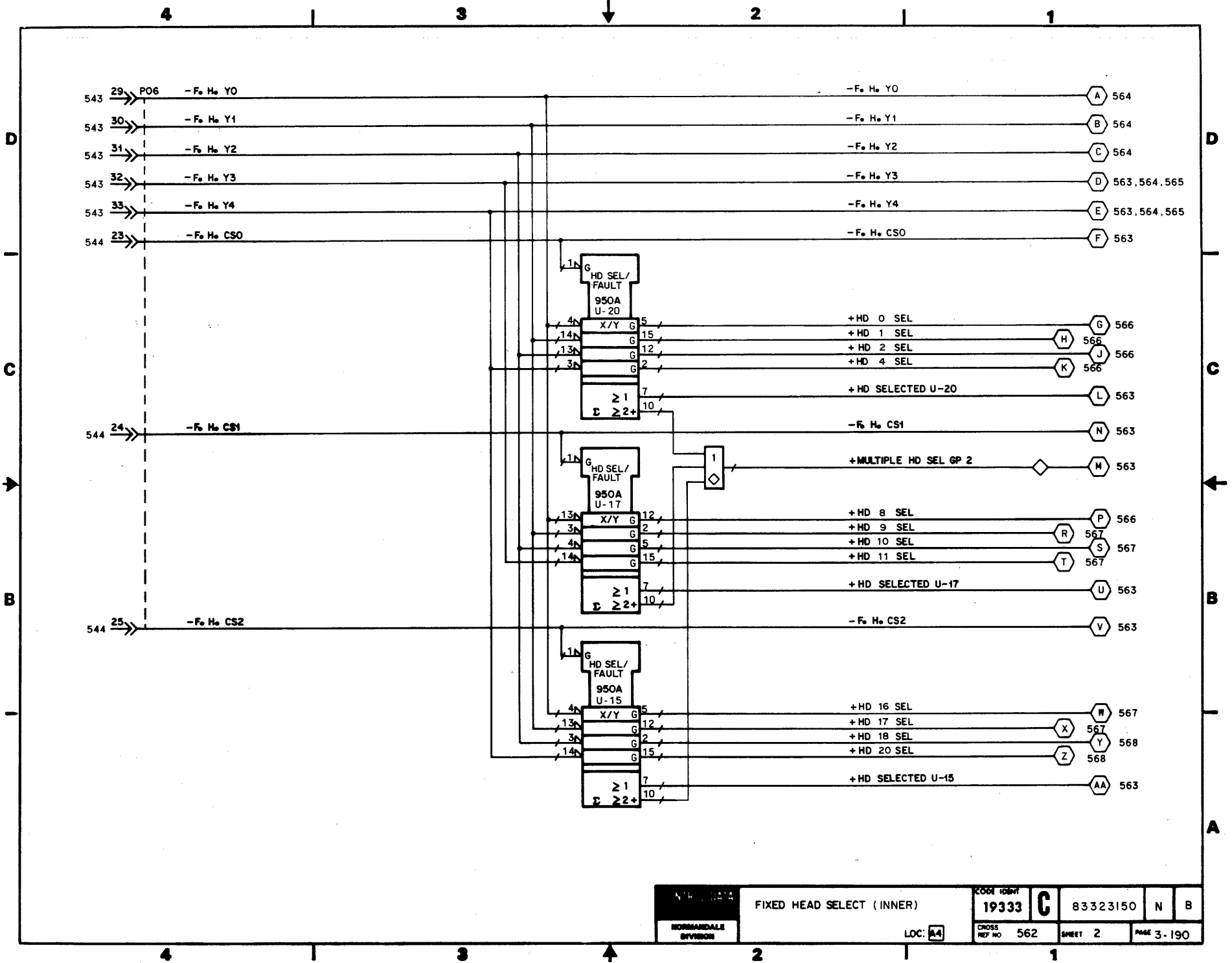
NOTES:



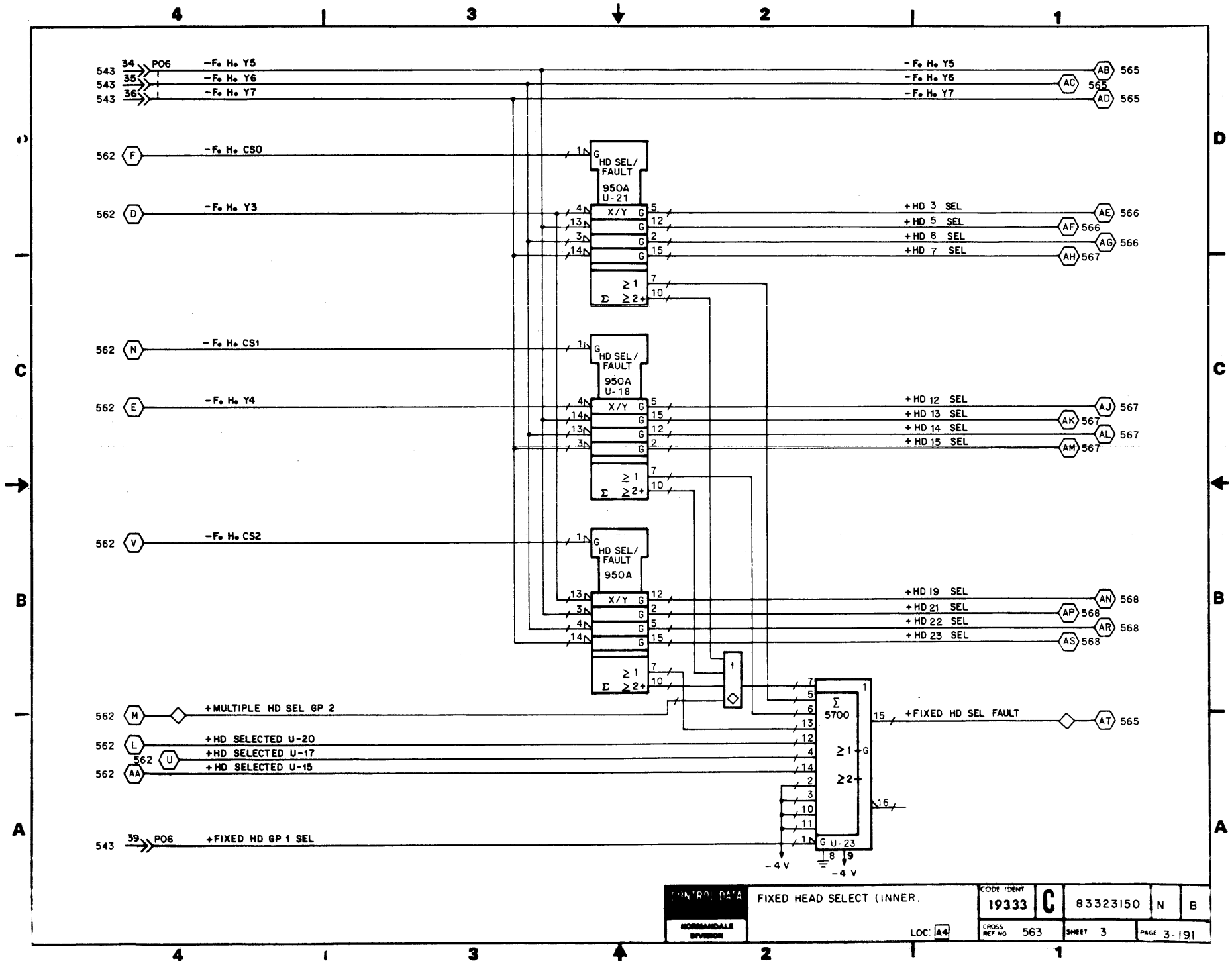
2 TYPICAL CR SCHEMATIC

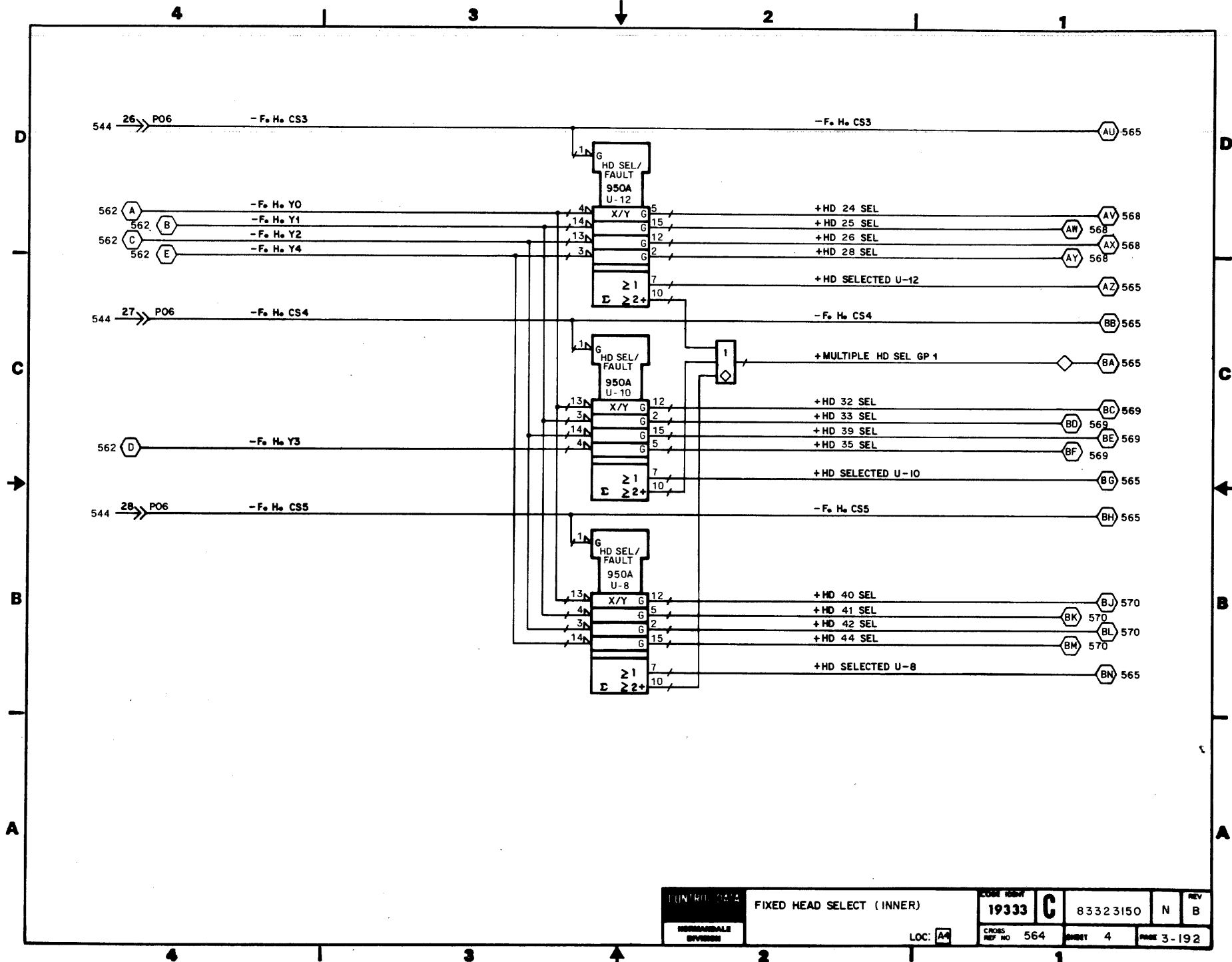


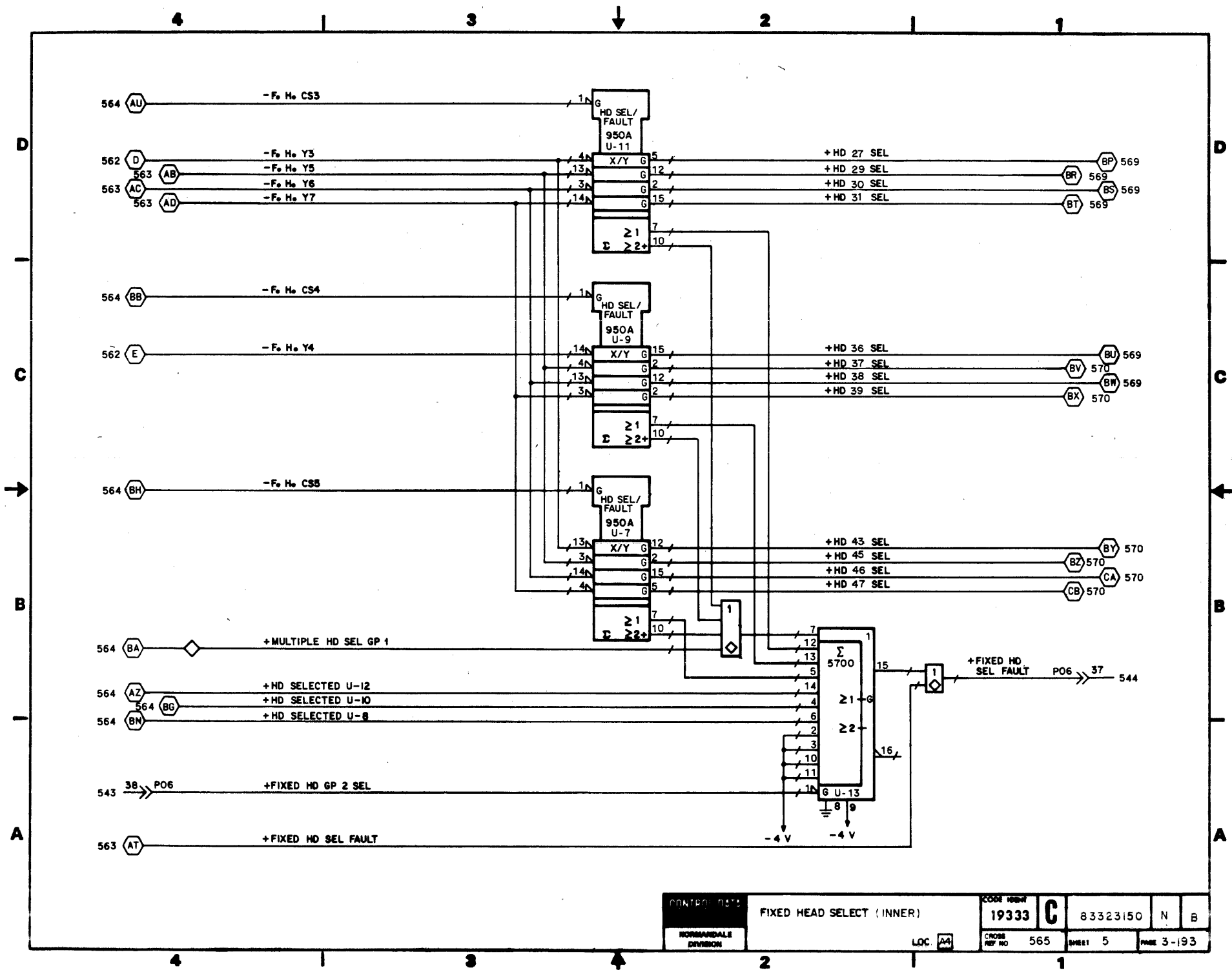
CONTROL DATA NORMANDALE DIVISION	FIXED HEAD DATA (OUTER)	CODE IDENT 19333	C	83323150	N	D
	LOC: A4	CROSS REF NO 560	SHEET 10	PAGE 3-188		

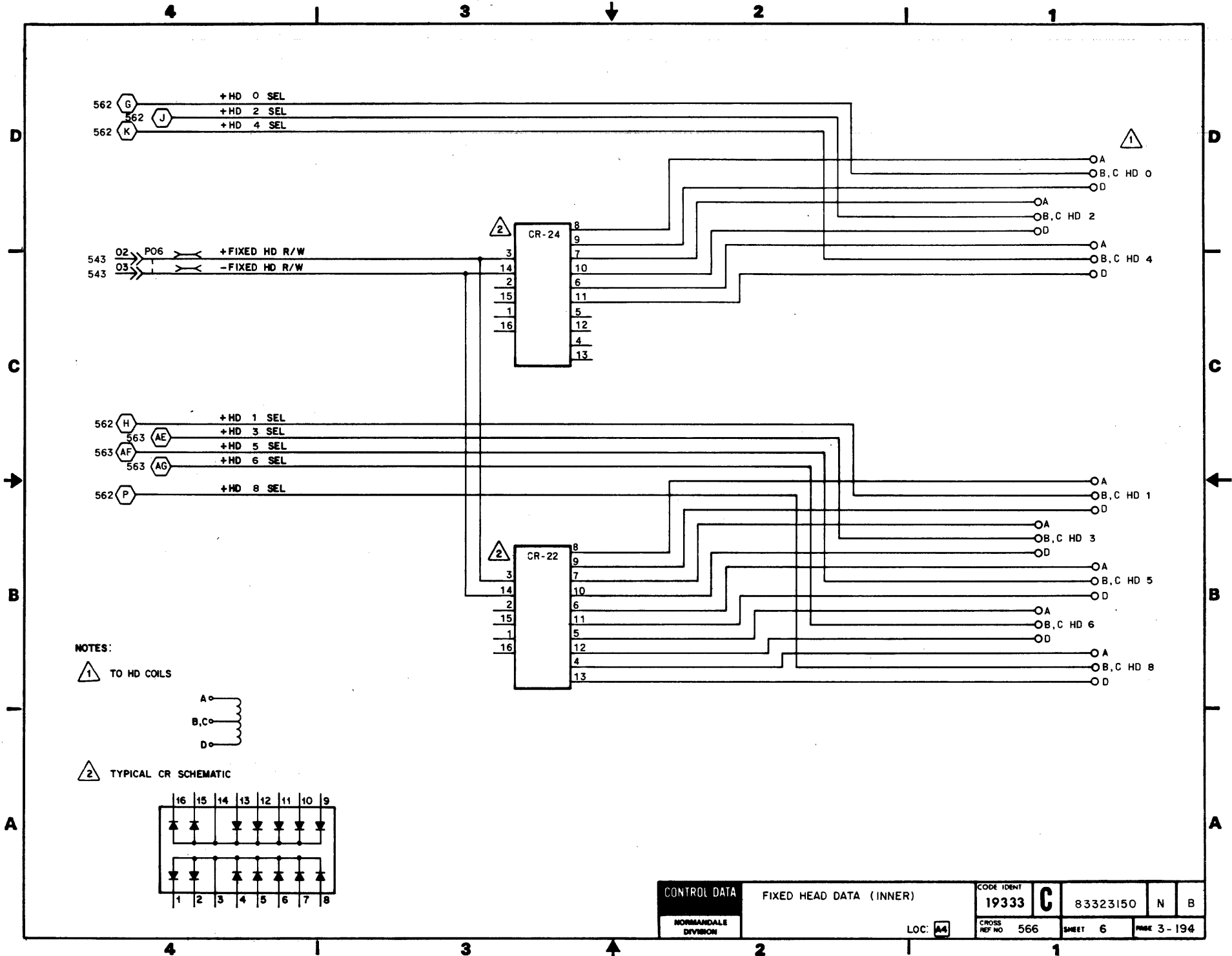


NORMANDEALE DIVISION	FIXED HEAD SELECT (INNER)	CODE IDENT	19333	C	83323150	N	B
	LOC: A4	CROSS REF NO	562	SHEET	2	PAGE	3-190







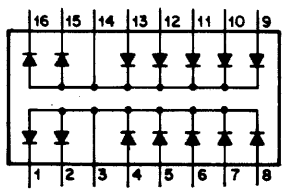


NOTES:

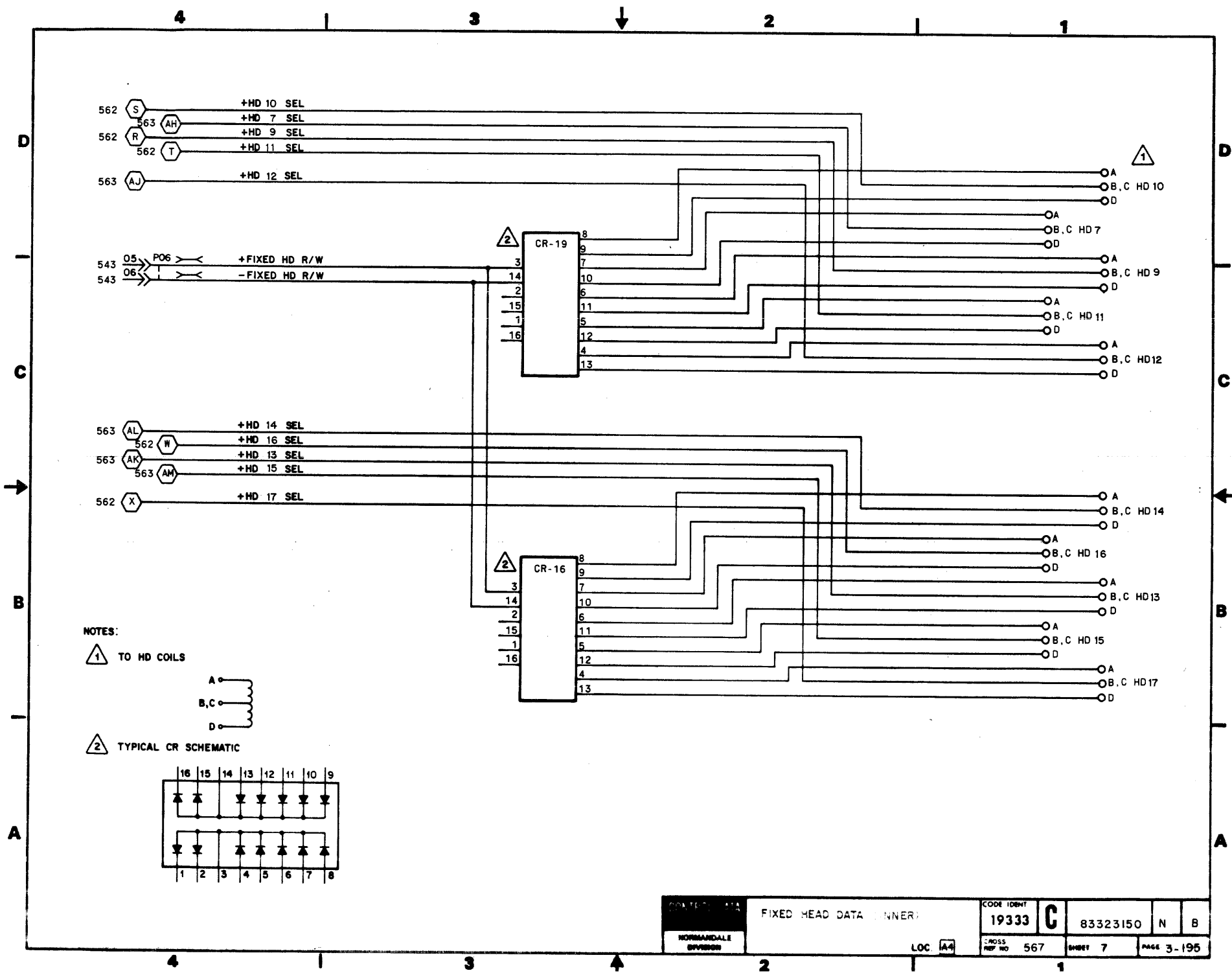
△ 1 TO HD COILS

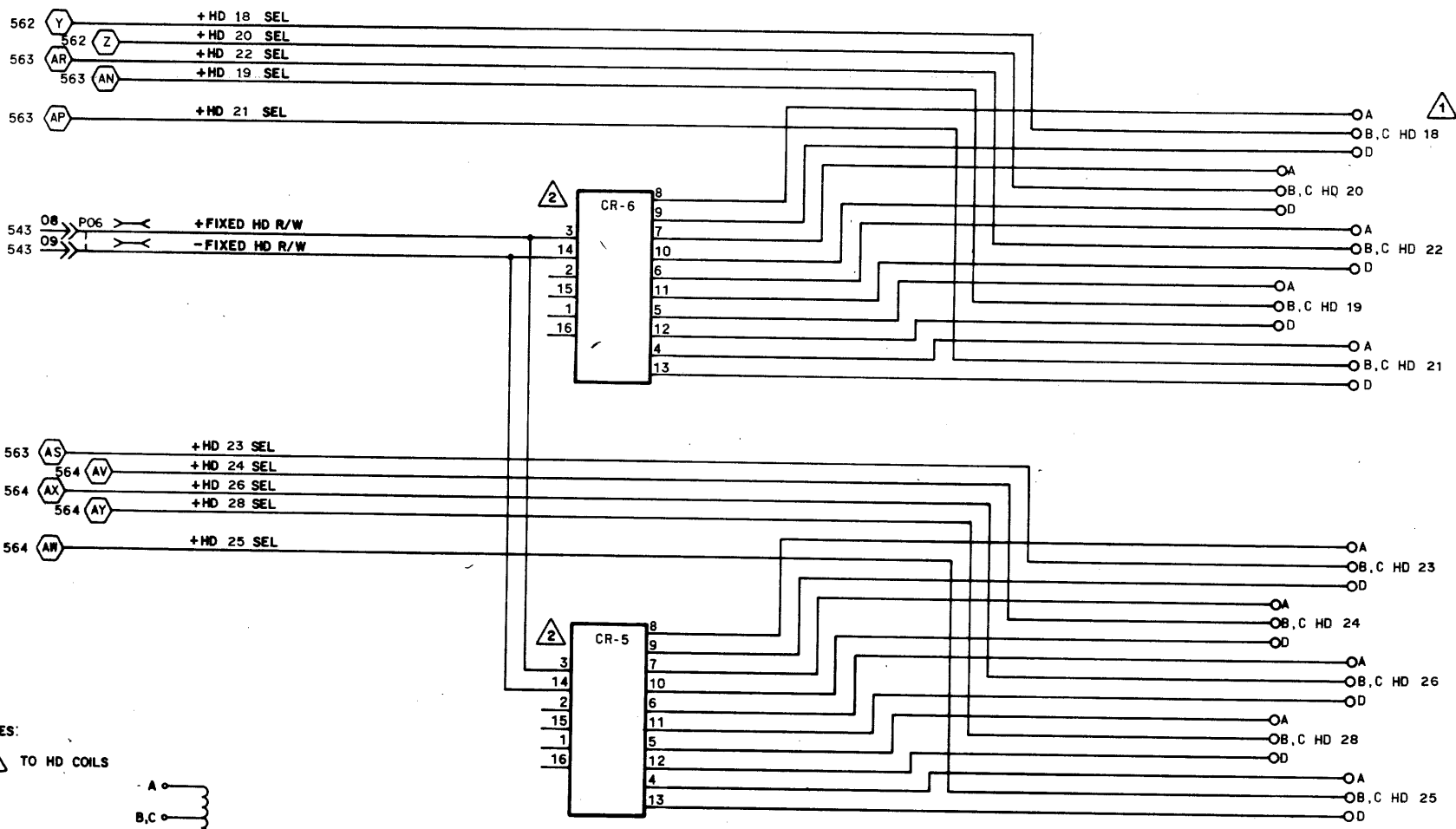


△ 2 TYPICAL CR SCHEMATIC

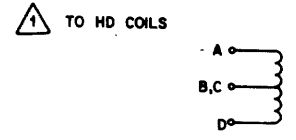


CONTROL DATA NORMANDALE DIVISION	FIXED HEAD DATA (INNER)	CODE IDENT	19333	C	83323150	N	B
		CROSS REF NO	566	SHEET	6	PAGE	3-194
LOC: A4							

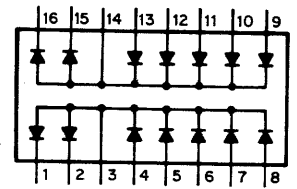


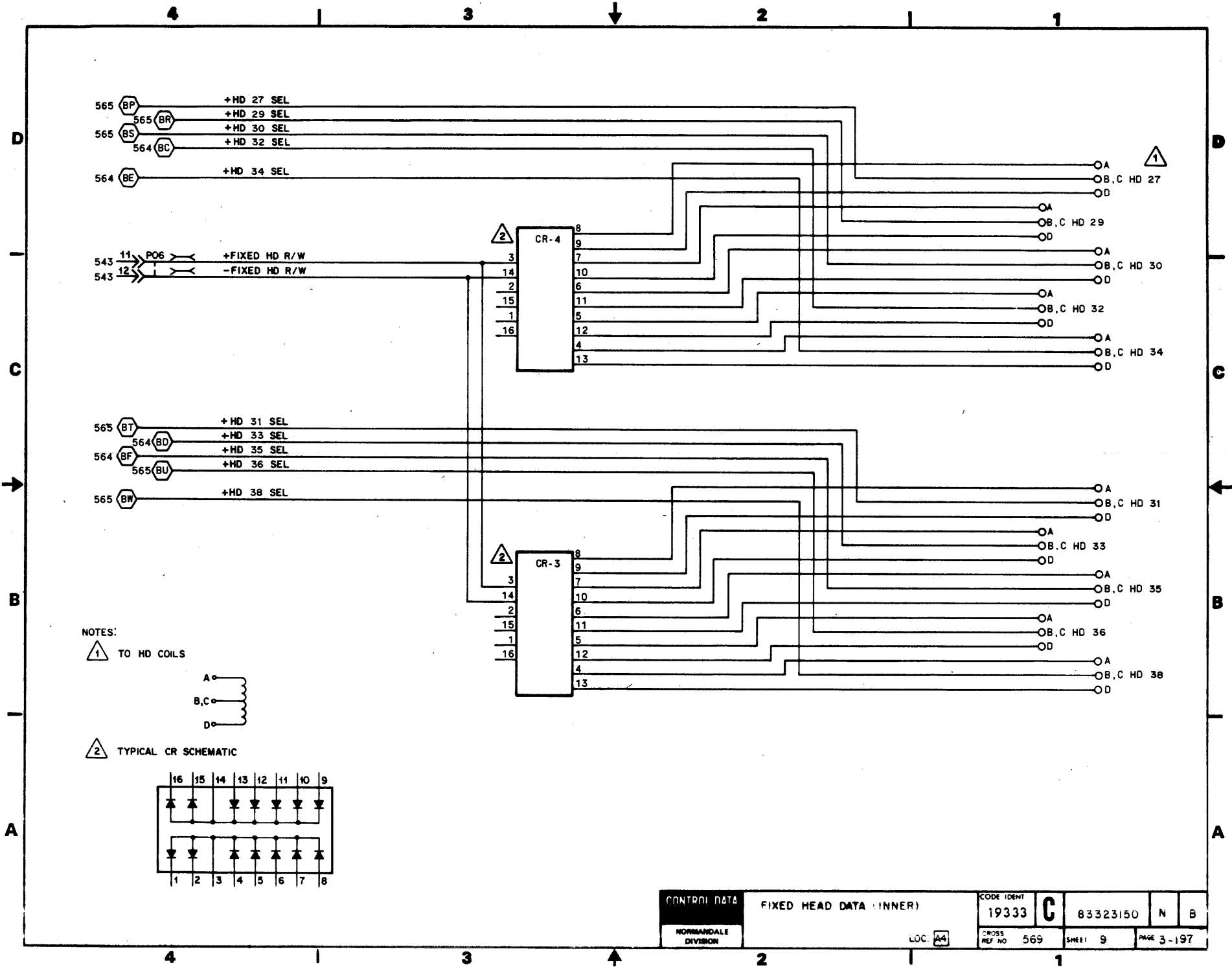


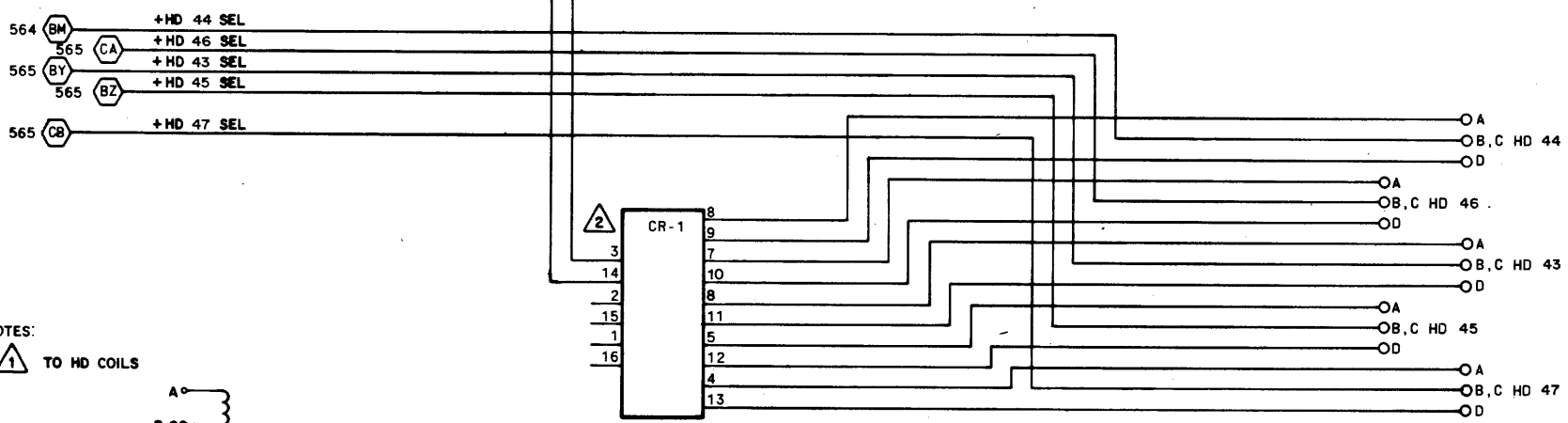
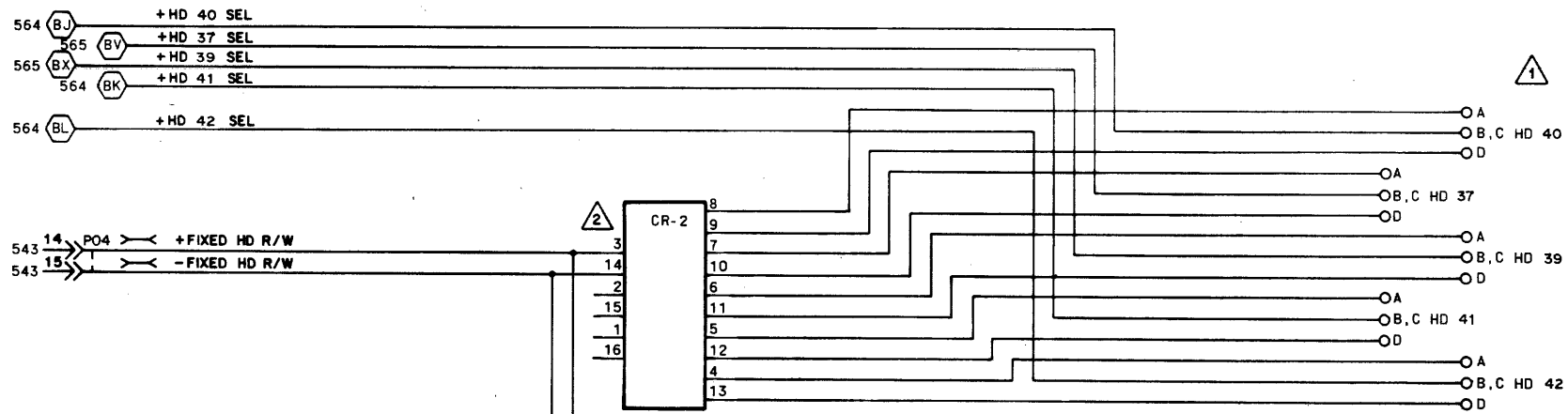
NOTES:



2 TYPICAL OR SCHEMATIC



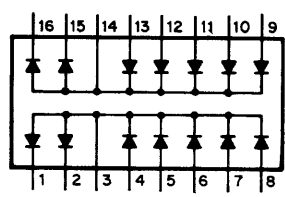




NOTES:

1 TO HD COILS

2 TYPICAL CR SCHEMATIC



SECTION 4

WIRE LISTS

WIRE LIST

INTRODUCTION

The wire list section is presented in two parts. The first part of the section explains how to use the wire lists and provides an explanation of the columns present on the lists. The second part of the section contains the actual wire lists for the backpanel and harnessing.

READING OF WIRE LIST

The wire lists for the logic chassis wire wrap panel shows the origin, destination, and Z level of all wire wrap connections. The wires are listed by both origin and destination in the order of card location and pin number. See the example under the Origin/Destination paragraph. The following is an explanation of the columns used on the wirelist (refer to figure 4-1).

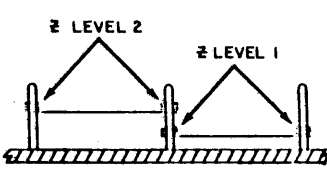
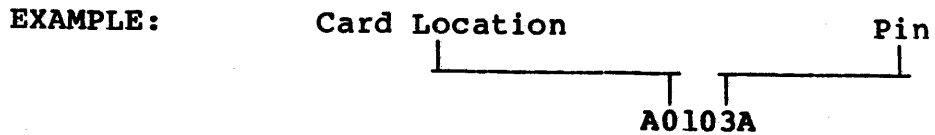
TITLE WIREWRAP LIST		WL	DOCUMENT NO. LOGIC W/W	SHEET NO. 1 of 12	REV. A
SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTI- NATION	Z LEVEL	NOTES	
	A0101B	A0102A	1	 <p style="text-align: center;">9T211</p>	
	A0102A	A0101B	1		
	A0102B	A1708A	1		
	A0103A	A0231A	1		
	A0230A	A1712A	1		
	A0230B	A0612B	1		
	A0231A	A1326B	2		
	A0231A	A0103A	1		

Figure 4-1. Example of Logic Wirewrap List

ORIGIN/DESTINATION

Both origin and destination columns contain a six character number. The origin column identifies where the wire begins. The destination column identifies where the wire ends. The first three characters of the six character number in each column represents the card location. The second three characters represent the pin number to which the wire is attached.



Z LEVEL

The Z level identifies the position of the wire wrap on the pin. There are two Z levels assigned to each pin (refer to figure 4-1). Z level 1 is that level closest to the wire wrap panel surface, while Z level 2 is the farthest. Pins may hold one or two wire wraps; but the Z level must be maintained at both ends of the wire wrap connections.

NOTES

The notes column is the last column on the wire list. Signal names, history, or other pertinent information is shown in the notes column.

TITLE

Wire Wrap Assembly (Ref: 47230137/47230139/47230140)

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTINATION	Z LEVEL	NOTES
	AJ103R	C0236A	1	
	A0104A	C0241A	1	
	AJ104R	C0237A	1	
	A0105A	C0241B	1	
	A0105R	C0240R	1	
	AJ106R	C0239A	2	
	A0107R	C0235A	2	
	AJ107R	A0308A	1	
	AJ108R	C0435A	1	
	A0111R	C0433R	1	
	AJ114R	C0238A	1	
	A0118R	A0443A	1	
	A0120R	A0404A	1	
	AJ120R	RJ205A	2	
	A0121R	R0131A	1	
	A0123R	RJ123R	1	
	A0143R	A0332A	2	
	A0307A	A0405A	1	
	A0308A	A0107R	1	
	A0309A	A0410A	1	
	AJ315A	AJ404R	1	
	A0315A	R0231R	2	
	A0316R	AJ334A	1	
	A0327A	A0437A	1	
	AJ328A	AJ437R	1	
	A0332A	A0409A	1	
	A0332A	A0143R	2	
	A0333A	R0212A	1	
	A0334A	A0316R	1	
	AJ336A	RJ225A	1	
	A0341A	A0441R	1	
	AJ403A	RJ224A	1	
	A0404A	A0120R	1	
	AJ404R	A0315A	1	
	AJ405A	A0307A	1	
	A0408A	R0226R	1	
	A0408R	RJ243R	1	
	A0409A	A0332A	1	
	A0409R	RJ209A	1	
	A0410A	A0309A	1	
	A0410R	C0403R	2	
	A0410R	A0432A	1	
	A0412A	C0430A	1	
	A0413A	RJ413A	2	
	A0413R	R0413R	2	
	A0414A	RJ414A	2	
	A0415A	R0415A	1	
	A0415R	RJ415R	2	

KOR 0710A

TITLE Wire Wrap Assembly				
SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTINATION	Z LEVEL	NOTES
	A0416B	B0415B	1	
	A0417A	A0419B	2	
	A0417B	B0417B	2	
	A0418A	B0418A	1	
	A0418B	B0418B	1	
	A0419A	R0419A	1	
	A0419B	C0431B	1	
	A0419B	A0417A	2	
	A0420A	B0420A	1	
	A0420B	R0420B	1	
	A0421A	B0421A	1	
	A0421B	B0421B	1	
	A0422A	R0422A	1	
	A0422B	B0422B	1	
	A0424A	B0424A	1	
	A0424B	B0424B	1	
	A0428A	C0433A	1	
	A0428B	C0436A	1	
	A0429A	C0405B	1	
	A0431B	C0430B	1	
	A0432A	A0438A	2	
	A0432A	A0410B	1	
	A0432B	R0432B	2	
	A0433A	C0422B	1	
	A0433B	B0319A	1	
	A0434B	R0434B	2	
	A0435A	B0435A	1	
	A0436A	B0436A	2	
	A0436B	R0436B	2	
	A0436A	C0340A	1	
	A0437A	A0327A	1	
	A0437B	B0437B	2	
	A0437B	A0328A	1	
	A04377	B0437A	2	
	A0438A	A0432A	2	
	A0438B	C0415B	1	
	A0440A	B0440A	1	
	A0440B	C0421A	2	
	A0441A	B0441A	2	
	A0441B	A0341A	1	
	A0441B	B0441B	2	
	A0442A	B0442A	2	
	A0442B	C0440A	2	
	A0443A	A0113B	1	
	A0443A	B0443A	2	
	A0443B	B0443B	2	
	B0123B	A0123B	1	
				Applies to BZ9A1J/K only

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TITLE Wire Wrap Assembly				
SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTINATION	Z LEVEL	NOTES
B0124A		B0233A	1	
B0125A		B0233B	1	
B0126A		B0234B	1	
B0127A		B0234A	1	
B0131A		A0121B	1	
B0132A		C0237B	1	
B0133A		B0324B	1	
B0134A		C0235B	1	
B0136A		B0325A	1	
B0137A		B0335A	1	
B0141A		B0316A	1	
B0142A		B0322B	1	
B0143A		B0326A	1	
B0204A		B0309A	1	
B0205A		A0120B	2	
B0207A		B0436B	1	
B0208B		C0409B	1	
B0209A		A0409B	1	
B0210A		B0441A	1	
B0210B		B0324A	1	
B0212A		A0333A	1	
B0216A		B0340A	1	
B0218A		B0436A	1	Applies only to units without long last sector..
B0218A		C0330B	1	Applies only to units with long last sector.
B0218B		B0322A	1	
B0219A		B0332A	1	
B0219B		C0420B	1	
B0220A		B0332B	1	
B0222A		B0334B	1	
B0222B		B0327A	1	
B0224A		A0403A	1	
B0224A		C0126A	2	BZ5A1V/W,BZ5A5G/H only
B0224B		B0333B	1	
B0225A		A0336A	1	
B0225B		B0321B	1	
B0226A		B0338B	1	
B0226A		C0127A	2	BZ5A1V/W,BZ5A5G/H only
B0226B		A0408A	1	
B0227A		B0331A	1	
B0228B		B0443B	1	
B0228B		B0333A	2	
B0229A		B0329A	1	
B0229B		B0320B	1	
B0230A		B0432B	1	

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TITLE

Wire Wrap Assembly

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTINATION	Z LEVEL	NOTES
	B0231A	B0434B	1	
	B0231B	A0315A	2	
	B0232B	B0239A	1	
	B0233A	B0124A	1	
	B0233B	B0125A	1	
	B0234A	B0127A	1	
	B0234B	B0126A	1	
	B0235A	B0413A	1	
	B0235B	B0435A	2	
	B0236B	B0325B	1	
	B0237A	B0414A	1	
	B0237B	B0415B	1	
	B0238A	B0413B	1	
	B0239A	B0232B	1	
	B0243B	A0408B	1	
	B0303A	C0230A	1	
	B0303A	B0419A	2	
	B0304B	C0225B	1	
	B0304B	B0418A	2	
	B0305A	B0306A	1	
	B0305B	B0420A	2	
	B0305B	C0225A	1	
	B0306A	B0305A	1	
	B0306B	B0310A	1	
	B0307A	B0424A	2	
	B0307A	C0231A	1	
	B0308B	B0422A	2	
	B0308B	C0240A	1	
	B0309A	B0204A	1	
	B0310A	B0306B	1	
	B0311A	C0232B	1	
	B0311A	B0420B	2	
	B0311B	C0413A	1	
	B0311B	B0424B	2	
	B0312A	B0422B	2	
	B0312A	C0203B	1	
	B0313A	C0204B	1	
	B0313A	B0421A	2	
	B0314B	B0421B	2	
	B0314B	C0203A	1	
	B0316A	B0141A	1	
	B0317A	C0137A	1	
	B0317B	C0228A	1	
	B0318A	C0129A	1	
	B0319A	A0433B	1	
	B0319A	B0433B	2	

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TITLE Wire Wrap Assembly

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTINATION	Z LEVEL	NOTES
	R0319R	C0229A	1	
	B0320A	C0134A	1	
	B0320B	B0229R	1	
	B0321R	B0225B	1	
	B0322A	B0218R	1	
	B0322B	B0142A	1	
	B0323B	B0327B	1	
	B0324A	B0210R	1	
	B0324B	B0133A	1	
	B0325A	B0136A	1	
	B0325B	B0236R	1	
	B0326A	B0143A	1	
	B0326B	C0222A	1	
	B0327A	B0222B	1	
	B0327B	B0323R	1	
	B0328A	C0242A	1	
	B0328B	C0242B	1	
	B0329A	B0229A	1	
	B0329B	C0142A	1	
	B0330B	C0226A	1	
	B0331A	B0440A	2	
	B0331A	B0227A	1	
	B0332A	B0219A	1	
	B0332B	B0220A	1	
	B0333A	B0228R	2	
	B0333B	B0224R	1	
	B0334B	B0222A	1	
	B0335A	B0137A	1	
	B0335B	B0339B	2	
	B0336A	C0238B	1	
	B0337B	B0339B	1	
	B0338B	B0226A	1	
	B0339B	B0335B	2	
	B0339B	B0337B	1	
	B0340A	B0216A	1	
	B0340B	C0138A	1	
	B0410R	B0432A	1	
	B0410B	C0410B	2	
	B0413A	A0413A	2	
	B0413A	B0235A	1	
	B0413B	A0413B	2	
	B0413B	B0238A	1	
	B0414A	B0237A	1	
	B0414A	A0414A	2	
	B0415A	A0415A	1	
	B0415A	C0226B	2	

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TITLE				
Wire Wrap Assembly				
SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTINATION	Z LEVEL	NOTES
B0415B		A0415B	2	
B0415B		B0237B	1	
B0416B		C0211B	2	
B0416B		A0416B	1	
B0417A		B0419B	2	
B0417B		C0231B	1	
B0417B		A0417B	2	
B0418A		B0304B	2	
B0418A		A0418A	1	
B0418B		A0418B	1	
B0418B		C0417B	2	
B0419A		A0419A	1	
B0419A		B0303A	2	
B0419B		C0432B	1	
B0419B		B0417A	2	
B0420A		B0305B	2	
B0420A		A0420A	1	
B0420B		B0311A	2	
B0420B		A0420B	1	
B0421A		A0421A	1	
B0421A		B0313A	2	
B0421B		A0421B	1	
B0421B		B0314B	2	
B0422A		B0308B	2	
B0422A		A0422A	1	
B0422B		B0312A	2	
B0422B		A0422B	1	
B0424A		B0307A	2	
B0424A		A0424A	1	
B0424B		A0424B	1	
B0424B		B0311B	2	
B0428A		C0434B	1	
B0428B		C0438A	1	
B0429A		C0403A	1	
B0431B		C0435B	1	
B0432A		B0410B	1	
B0432A		B0438A	2	
B0432B		B0230A	1	
B0432B		A0432B	2	
B0433A		C0404B	1	
B0433B		B0319A	2	
B0434B		A0434B	2	
B0434B		B0231A	1	
B0435A		B0235B	2	
B0435A		A0435A	1	
B0436A		B0218A	1	

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TITLE
Wire Wrap Assembly

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTINATION	Z LEVEL	NOTES
	R0436A	A0436A	2	
	R0436B	A0436B	2	
	R0436R	R0207A	1	
	R0437A	A04377	2	
	R0437B	A0437B	2	
	R0438A	B0432A	2	
	R0439B	C0414B	1	
	R0440A	B0331A	2	
	R0440A	A0440A	1	
	R0440B	C0413B	2	
	R0441A	A0441A	2	
	R0441A	B0210A	1	
	R0441B	A0441B	2	
	R0442A	C0216B	1	
	R0442A	A0442A	2	
	R0442B	C0424B	2	
	R0443A	A0443A	2	
	R0443B	B0228B	1	
	R0443B	A0443B	2	
	C0104A	B0320A	1	
	C0112A	C0205B	1	
	C0126A	B0224A	2	BZ5A1V/W, BZ5A5G/H only
	C0127A	B0226B	2	BZ5A1V/W, BZ5A5G/H only
	C0129A	B0318A	1	
	C0137A	R0317A	1	
	C0138A	R0340B	1	
	C0139B	C0205A	1	
	C0142A	B0329B	1	
	C0203A	B0314B	1	
	C0203B	B0312A	1	
	C0204B	B0313A	1	
	C0205A	C0139B	1	
	C0205B	C0112A	1	
	C0211B	B0416B	2	
	C0216B	B0442A	1	
	C0216B	C0311B	2	⚠
	C0222A	B0326B	1	
	C0225A	B0305B	1	
	C0225B	B0304B	1	
	C0226A	B0330B	1	
	C0226B	B0415A	2	
	C0228A	B0317B	1	
	C0229A	B0319B	1	
	C0230A	B0303A	1	
	C0231A	B0307A	1	
	C0231B	B0417B	1	

BZ5A1V/W, BZ5A5G/H only
BZ5A1V/W, BZ5A5G/H only

⚠ Applies only to units with long last sector

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TITLE

Wire Wrap Assembly

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTINATION	Z LEVEL	NOTES
	C0232B	B0311A	1	
	C0233B	C0419B	1	
	C0235A	A0107B	2	
	C0235A	A0107B	2	
	C0235B	B0134A	1	
	C0236A	A0103B	1	
	C0237A	A0104B	1	
	C0237B	B0132A	1	
	C0238A	A0114B	1	
	C0238B	B0336A	1	
	C0239A	A0106B	2	
	C0240A	B0308B	1	
	C0240B	A0105B	1	
	C0241A	A0104A	1	
	C0241B	A0105A	1	
	C0242A	B0328A	1	
	C0242B	B0328B	1	
	C0308B	C0316B	1	
	C0311B	C0216B	2	
	C0315A	C0316A	2	
	C0315A	C0323A	1	
	C0315B	C0316A	1	
	C0315B	C0333A	2	
	C0316A	C0315A	2	
	C0316A	C0315B	1	
	C0316B	C0308B	1	
	C0316B	C0331A	2	
	C0323A	C0315A	1	
	C0330B	B0218A	1	
	C0331A	C0316B	2	
	C0332B	C0333A	1	
	C0333A	C0315B	2	
	C0333A	C0332B	1	
	C0340A	A0436A	1	
	C0403A	B0429A	1	
	C0403B	A0410B	2	
	C0403B	C0417A	1	
	C0404B	B0433A	1	
	C0405A	C0410B	1	
	C0405B	A0429A	1	
	C0408A	C0417B	1	
	C0409A	C0413B	1	
	C0409B	C0421B	2	
	C0409B	B0208B	1	
	C0410B	C0405A	1	



Applies only to units with long last sector

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TITLE

Wire Wrap Assembly

SIGNAL NAME OR NUMBER IDENTIFICATION	ORIGIN	DESTINATION	Z LEVEL	NOTES
	C0410B	B0410B	2	
	C0412A	C0421A	1	
	C0413A	C0419B	2	
	C0413A	B0311B	1	
	C0413B	B0440B	2	
	C0413B	C0409A	1	
	C0414B	B0438B	1	
	C0415A	C0424B	1	
	C0415B	A0438B	1	
	C0416B	C0427B	1	
	C0417A	C0403B	1	
	C0417B	B0418B	2	
	C0417B	C0408A	1	
	C0418A	C0432A	1	
	C0418B	C0440A	1	
	C0419B	C0413A	2	
	C0419B	C0233B	1	
	C0420B	B0219B	1	
	C0421A	C0412A	1	
	C0421A	A0440B	2	
	C0421B	C0409B	2	
	C0422B	A0433A	1	
	C0424B	B0442B	2	
	C0424B	C0415A	1	
	C0427B	C0416B	1	
	C0430A	A0412A	1	
	C0430B	A0431B	1	
	C0431B	A0419B	1	
	C0432A	C0418A	1	
	C0432B	B0419B	1	
	C0433A	A0428A	1	
	C0433B	A0111B	1	
	C0434B	B0428A	1	
	C0435A	A0108B	1	
	C0435B	B0431B	1	
	C0436A	A0428B	1	
	C0438A	B0428B	1	
	C0440A	C0418B	1	
	C0440A	A0442B	2	

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SECTION 5

PARTS DATA

INTRODUCTION

This section provides an Illustrated Parts Breakdown and a Spare Parts List for all the mini module drives (MMDs) listed in the configuration chart in the front of this manual.

Information in this section is divided into two major categories as follows:

- Illustrated Parts Breakdown -- This breakdown provides part number information for all field replaceable items except cables and harnesses.
- Spare Parts List -- This is a list of recommended spare parts.

NOTE

Parts listed in the illustrated parts breakdown, but not in the spare parts list, may be long lead time items subject to significant delays in supplying of parts.

SECTION 5A

ILLUSTRATED PARTS BREAKDOWN

GENERAL

The Illustrated Parts Breakdown (IPB) provides the information needed to order field replaceable parts. This information is presented in assembly illustrations and parts lists.

The symbols used in this section are explained in the following paragraphs along with a definition of some of the abbreviations used. Refer to the front of this manual for a complete list of abbreviations.

The illustrated parts breakdown is structured as follows: Each major assembly is shown in an exploded view and assigned a figure number. More than one illustration per figure number may be required for a complex assembly. In this case, the illustrations are titled figure X (sheet 1); figure X (sheet 2), etc. The parts shown on the illustrations are numbered. A parts list for each illustration begins on the page facing the illustration. The numbers on the figure correspond to the index numbers on the associated parts list. In some cases, the parts list will have more than one page for the corresponding sheet of the figure.

The Illustrated Parts Breakdown is divided into four columns:

Index Number Column -- The numbers given in this column correspond to the numbers shown on the illustration. When more than one entry is given for a particular index number, the application of each part is defined in the Notes column. Items not shown on an illustration are listed without index numbers.

Part Number Column -- This column provides the eight digit number by which a part may be ordered. There are several conditions when there will be an incomplete number or no number at all:

- The last two digits (referred to as tab numbers) are shown as XX. Used when an assembly changes tab numbers rapidly in the course of normal factory build. If it is

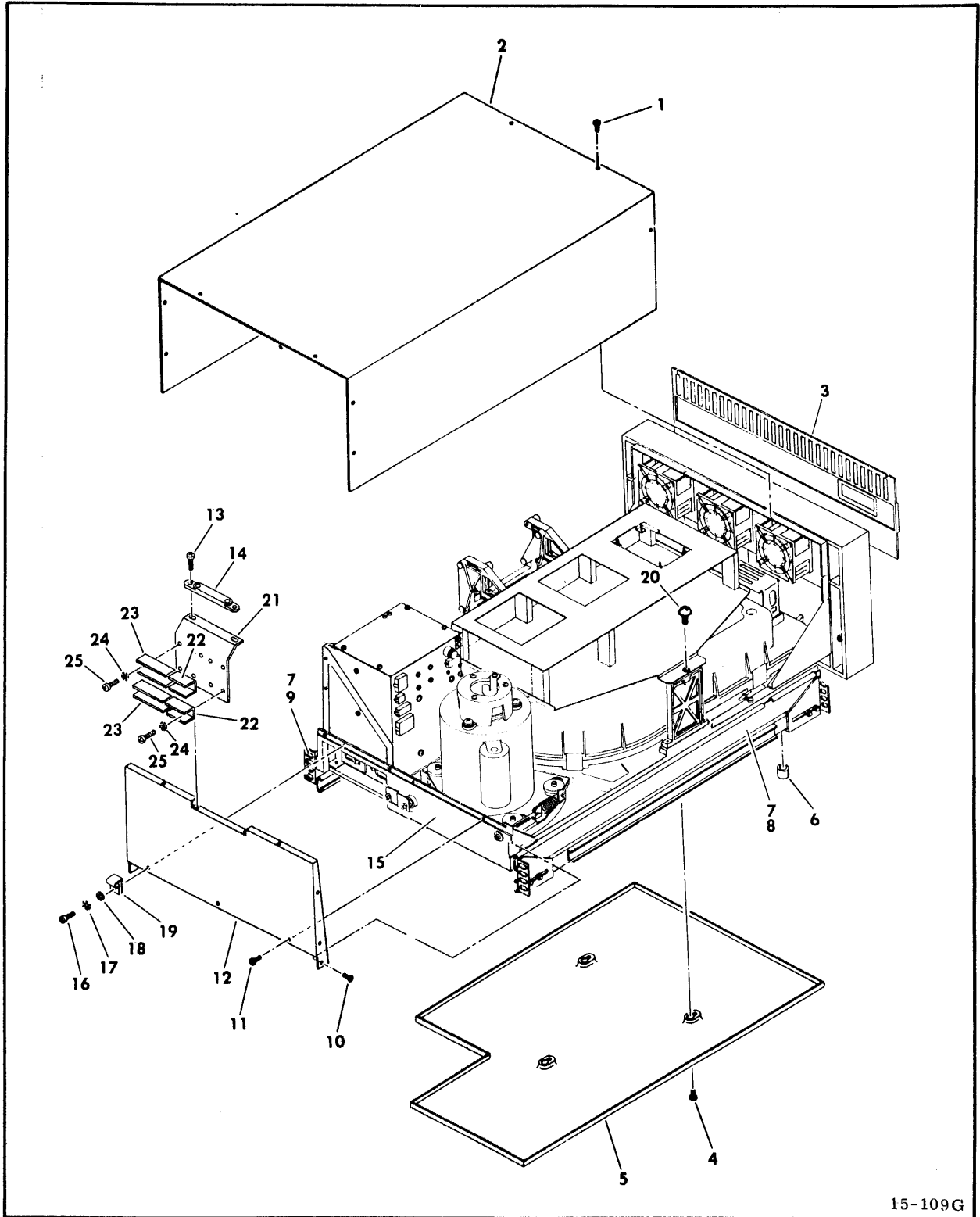
necessary to order these assemblies, the actual part number is found on the assembly identification label attached to the assembly. If the actual part number cannot be determined, include on the order the series code of the machine along with a list of all the change orders installed.

- NFR in the part number column. Used to indicate that an assembly is not field replaceable. If repair of the NFR item is necessary, refer to the maintenance section of this manual for further information.
- ## in the part number column. Indicates that the item is a recommended spare part and that the part number is located in the Spare Parts List (section 5B).

Description Column -- This column gives the name and a brief description of each part and assembly. The relationship of parts and assemblies is shown within the column by means of indentation. When an item is indented more than the previous item, it is part of the previous item.

When necessary, items are identified as being right or left side. Right and left are determined by facing the front panel of the drive.

Notes Column -- This column defines any multiple part number entries for a single index number. Multiple entries may be necessary to identify differences such as machine configuration (for example, whether the part is for a 50 Hz or 60 Hz machine) or to track history (for example, the part number differs between older and newer units).



15-109G

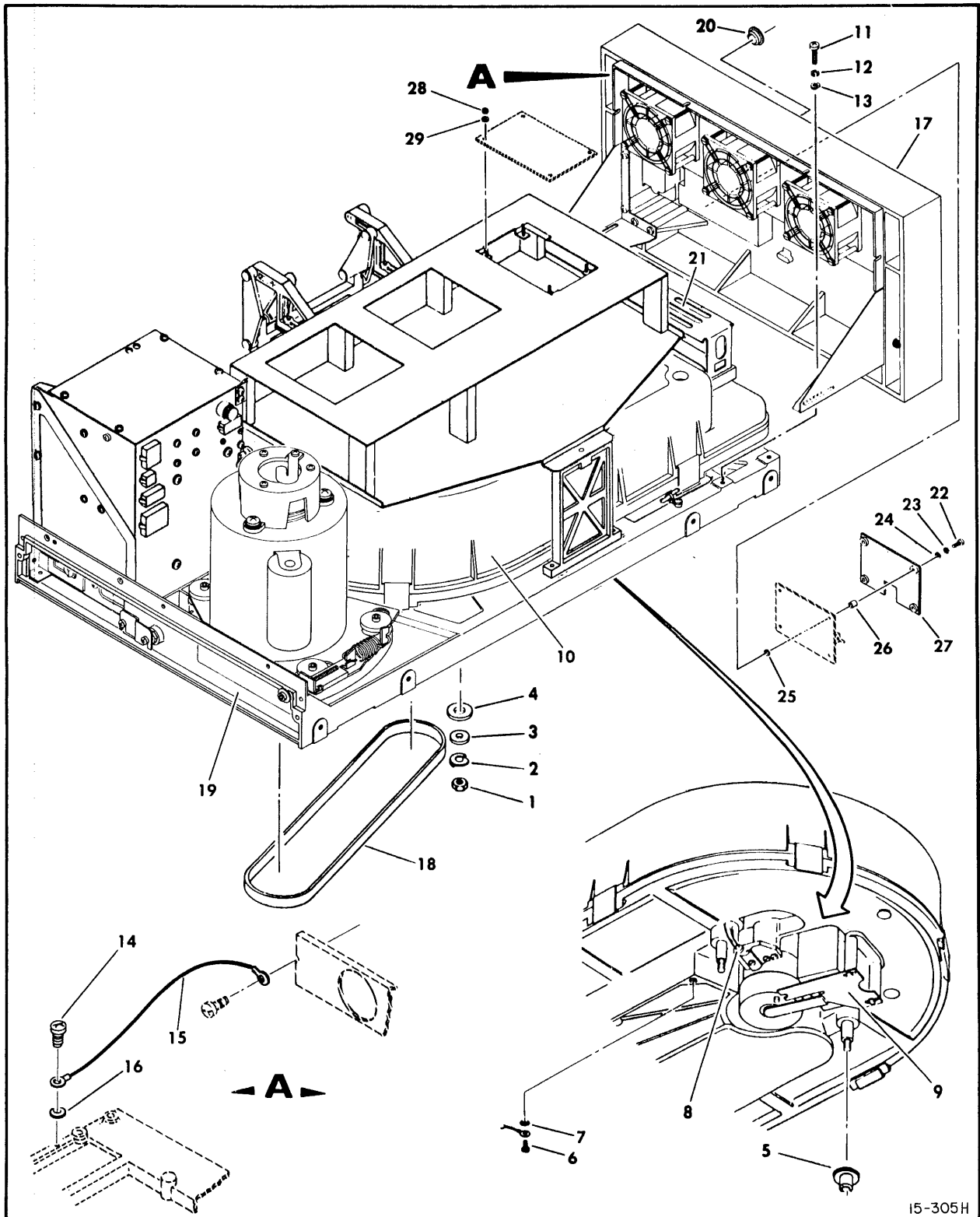
Figure 5-1. Top Level Assembly

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-1	730367XX	TOP LEVEL ASSEMBLY	80 MB
5-1	730368XX	TOP LEVEL ASSEMBLY	160 MB
5-1	823997XX	TOP LEVEL ASSEMBLY	80 MB
5-1	823998XX	TOP LEVEL ASSEMBLY	160 MB
1	92721202	SCREW, Sch Btn, 6-32 x 1/2	
2	73011300	COVER, Top	
3		PANEL, Color	See Configuration Chart in front of manual for part number
4	93592196	SCREW, SLFTPG, 8-32 x 1/4	
5	73022700	COVER, Bottom	
6	95796512	CLOSURE, Vinyl	
7	10125724	SCREW, Flat Hd, 8-32 x 3/8	All except BZ9A1J/K/L/M, BZ9A5E/F, BZ9A7E/F, BZ9A9G/H
7	10127122	SCREW, PHH PNH Mach, 8-32 x 3/8	BZ9A1J/K/L/M, BZ9A5E/F only
8	94391905	SLIDE, Quick Disconnect	All except BZ511A/B, BZ9A1J/K/L/M, BZ9A5E/F, BZ9A7E/F, BZ9A9G/H, BZ911A/B
8	94391907	SLIDE, Quick Disconnect	BZ511A/B, BZ911A/B
8	73043500	PLATE, Retainer	BZ9A1J/K/L/M, BZ9A5E/F only
9	94391904	SLIDE, Quick Disconnect	All except BZ511A/B, BZ9A1J/K/L/M, BZ9A5E/F, BZ9A7E/F, BZ9A9G/H, BZ911A/B
9	94391906	SLIDE, Quick Disconnect	BZ511A/B, BZ911A/B
9	73043500	PLATE, Retainer	BZ9A1J/K/L/M, BZ9A5E/F only
10	10125722	SCREW, Flat Hd, 8-32 x 1/4	
11	93592196	SCREW, SLFTPG, 8-32 x 1/4	
12	73019500	COVER, Rear	
13	10127113	SCREW, PHH PNH Mach, 6-32 x 3/8	
14	94386407	MOUNT, Cable	
15		DRIVE FINAL ASSEMBLY (See Figure 5-2)	

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-1		TOP LEVEL ASSEMBLY (Contd)	
16	93592200	SCREW, Mach, 8-32 x 3/8	
17	10126402	LOCKWASHER, #8	
18	10125606	WASHER, #8	
19	92602004	CABLE CLAMP	
20	93660107	SCREW, PHH PNH W/ Lockwasher	S/C 21 & Abv only
21	81914040	MOUNTING BRACKET) S/C 34 W/DJ02479
22	81567760	BAR, Mounting) & Abv except
23	81567761	BAR, Mounting) BZ5A9L/M,
24	10126403	LOCKWASHER #10) BZ5W1C/D,
25	10127144	SCREW, PHH PNH Mach, 10-32 x .625) BZ9A7A/B)
	92006812	PLATE, Equip Ident	
	82355113	I/O CABLE ASSEMBLY	BZ5A1J/K/R/S, BZ5A2C/D/G/H, BZ5A5J
	82355115	I/O CABLE ASSEMBLY	BZ5A2E/F,BZ5A6C/D, BZ9A2C/D,BZ9A6C/D
	94397000	EMBLEM, Product Ident	BZ5A1B/H/L,BZ5A2A/ B/J,BZ5A3A/BBZ5A4 A/B,BZ5A5A/B/D/F/ K/L,BZ5A6A/B,BZ5A9 E/F/N/P/S/T,BZ5W1 A/B/E/F/G/H,BZ9A1 A/B/N/W/Y/Z,BZ9A2 A/B,BZ9A3A/B,BZ9A4 A/B,BZ9A5A/B,BZ9A6 A/B/E/F,BZ9A7L/P/ R/S/T/U/W/Y only
	75778737	POWER CORD (60 Hz) (S/C 32 & Abv)	All except BZ5A1L, BZ9A7L
	75778701	POWER CORD (60 Hz) (S/C 31 & Blw)	All except BZ5A1L, BZ9A7L
	82392310	POWER CORD (60 Hz)	BZ5A1L,BZ9A7L
	75778710	POWER CORD (50 Hz) (S/C 31 & Blw)	All except BZ5W1D
	75778739	POWER CORD (50 Hz) (S/C 32 & Abv)	All except BZ5W1D
	93907492	POWER CORD (50 Hz) (S/C 31 & Blw)	BZ5W1D
	93907494	POWER CORD (50 Hz) (S/C 32 & Abv)	BZ5W1D
	92034702	PANEL, Front, Matched Set	BZ5A5K only
	92034700	PANEL, Front, Matched Set	BZ5A5L only
	77563300	BALLAST	BZ5A5K/L only

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-1	TOP LEVEL ASSEMBLY (Contd)		
	76846300	HARDWARE KIT*	All except BZ5A5 D/F, BZ5A9L/M/N/P, BZ5W1C/D/E/F, BZ511A/B, BZ9A1J/ K/L/M, BZ9A5E/F, BZ9A7A/B/C/D/ E/F/P/R, BZ9A9B
	76846303	HARDWARE KIT*	BZ5A9L/M, BZ5W1C/D, BZ9A7AB
	76846305	HARDWARE KIT*	BZ5W1E/F, BZ9A7C/D/P/R
	92555238	HARDWARE KIT*	BZ5A5D/F
	76846306	HARDWARE KIT*	BZ5A9N/P, BZ9A1J/K/L/M, BZ9A5E/F,
	76846308	HARDWARE KIT*	BZ511A/B, BZ911A/B
	76846307	HARDWARE KIT*	BZ9A9B

* Refer to table 5-1 for listing of kit piece parts.



15-305H

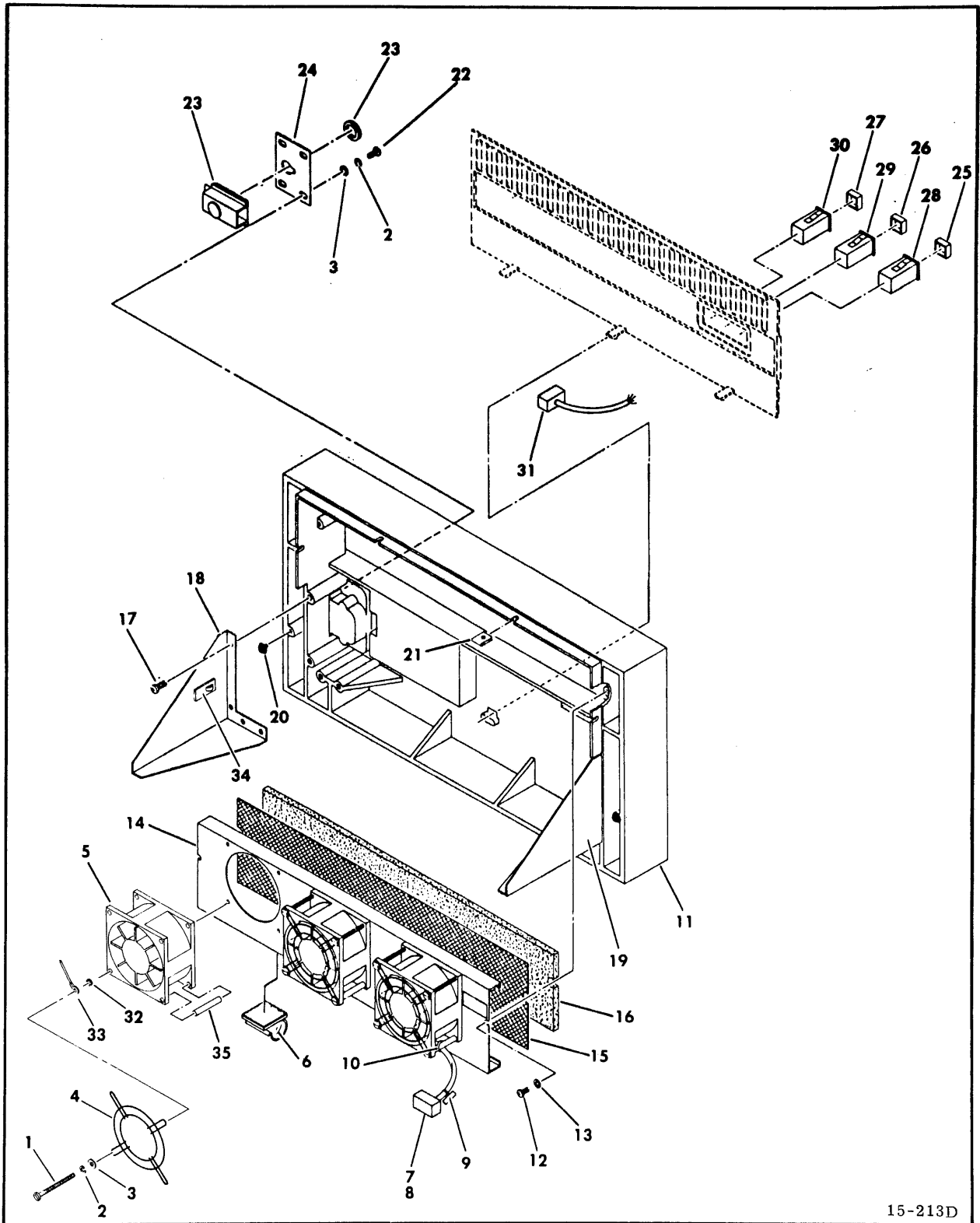
Figure 5-2. Drive Final Assembly

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-2	730355XX	DRIVE FINAL ASSEMBLY	See Note 1
5-2	823994XX	DRIVE FINAL ASSEMBLY	See Note 2
5-2	730639XX	DRIVE FINAL ASSEMBLY	See Note 3
1	10125301	NUT, Hex, 1/4-20	
2	94388900	LOCKWASHER, Special	
3	73005600	WASHER, Special Flat	
4	73020800	WASHER, Insulator	
5	73020900	BUSHING, Insulator	
6	10127122	SCREW, PHH PNH Mach, 8-32 x 3/8	
7	10126402	LOCKWASHER, #8	
8	##	SPEED TRANSDUCER ASSEMBLY	
9	##	GROUND SPRING	
10	##	MINI MODULE ASSEMBLY	
11	10127132	SCREW, PHH PNH Mach, 10-24 x 1/2	
12	10125805	LOCKWASHER, #10	
13	73045100	WASHER, Special	
14	10127122	SCREW, PHH PNH Mach, 8-32 x 3/8	S/C 15 & Abv
15	94369553	GROUND CABLE	S/C 15-19 only
16	10126402	LOCKWASHER, #8	S/C 15 & Abv
17		FRONT PANEL ASSEMBLY (See Figures 5-3, 5-4, 5-5)	
18	##	BELT, Flat Drive	
19		BASE FRAME ASSEMBLY (See Figures 5-6, 5-7)	
20	94305532	BUSHING	BZ5A1E/G/T/U, BZ9A1C/E/F/N/T only
21	73040600	CARD CLAMP ASSEMBLY	
22	10127114	SCREW, PHH PNH Mach, 6-32 x 1/2	
23	10125803	LOCKWASHER, #6	
24	10125605	WASHER, #6	
25	93564055	WASHER, Nylon	
26		NOT USED	
27		NOT USED	
28	10125105	NUT, Hex, 6-32	
29	93564032	WASHER, Nylon	
	17901516	SCREW, PHH, 8-32 x 3/8	

NOTE 1: All except BZ5A1J/K/R/S, BZ5A2C/D/G/H,
BZ5A5J, BZ5A9N/P/S/T, BZ5W1A/B/E/F/G/H,
BZ9A7C/D/E/F/G/R/P/S/U, BZ9A9C/D/G/H.

NOTE 2: BZ5A9N/P/S/T, BZ5W1A/B/E/F/G/H, BZ9A7
C/D/E/F/G/R/P/S/U, BZ9A9C/D/G/H.

NOTE 3: BZ5A1J/K/R/S, BZ5A2C/D/G/H, BZ5A5J only



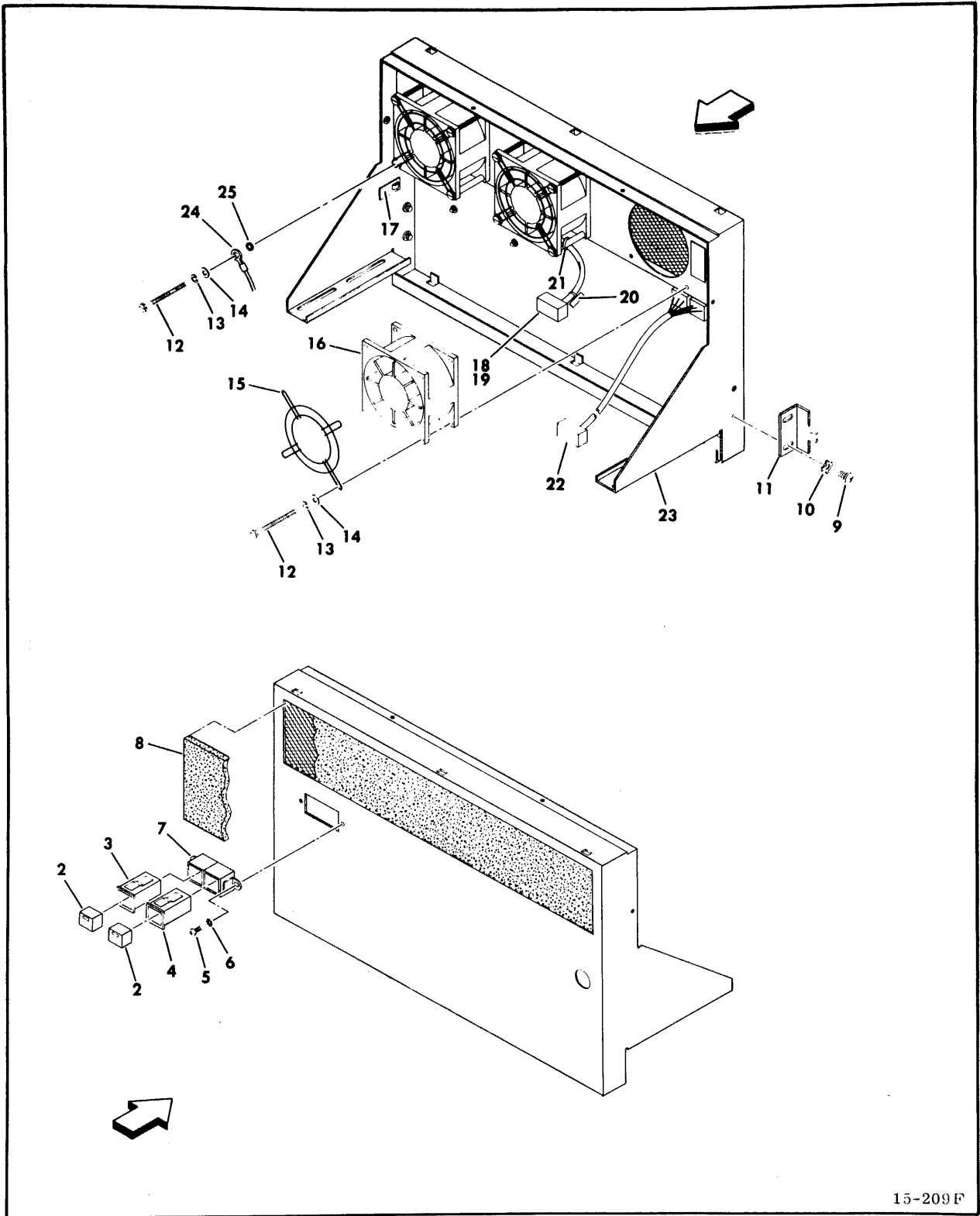
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Figure 5-3. Front Panel Assembly

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-3	730365XX	FRONT PANEL ASSEMBLY	See Note 1
5-3	823977XX	FRONT PANEL ASSEMBLY	See Note 2
1	10127343	SCREW, PHH PNH Mach, 6-32 x 2	
2	10125803	LOCKWASHER, #6	
3	10125605	WASHER, #6	
4	94222501	FINGER GUARD	
5	##	FAN ASSEMBLY	
6	94241018	CLIP, Cable	
7	51906003	CONNECTOR, Plug	
8	51906207	CONTACT, Socket	
9	94277409	CABLE TIE	
10	94277400	CABLE TIE	
11		PANEL, Control	See Configura- tion Chart in front of manual for part number.
12	93660077	SCREW, PHH PNH, 8-32 x 3/8	
13	10125606	WASHER, #8	
14	73045500	PLATE, Fan Mounting	
15	73045600	SCREEN, RFI	
16	##	AIR FILTER, Foam	
17	93660113	SCREW, PHH PNH, 10-32 x 1/2	
18	73012501	GUSSET PANEL	
19	73012500	GUSSET PANEL	
20	93623000	BUMPER, Rubber	
21	94100381	FASTENER, U Type	
22	10127112	SCREW, PHH PNH Machine, 6-32 x 5/16	
23	92010402	LATCH, Slam	
24	73040400	PLATE, Latch	
25	94394305	LENS, Blank	See Note 3
25	94394311	LENS, Blank	See Note 4
25	94394200	LENS, Lettered (Write Protect)	See Note 5
25	94394250	LENS, Lettered (Write Protect)	See Note 6
26	94394305	LENS, Blank	See Note 3
26	94394311	LENS, Blank	See Note 4

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-3		FRONT PANEL ASSEMBLY (Contd)	
27	94394311	LENS, Blank	See Note 4
27	94394230	LENS, Lettered (Write Protect)	See Note 5
27	94394257	LENS, Lettered (Write Protect)	See Note 11
27	94394254	LENS, Lettered (Write Prot)	See Note 10
28	##	INDICATOR, LED	See Note 7
29	##	SWITCH, P.B. W/LED Indicator	
30	94394007	SWITCH, P.B. W/LED Indicator	See Note 8
30	94394030	SWITCH, P.B. W/LED Indicator	See Note 9
31	73035100	HARNES ASSEMBLY	See Note 7
32	10126103	LOCKWASHER, #6	S/C 20 & Abv only
33	73067200	GROUND WIRE ASSEMBLY	S/C 20 & Abv only
34	94277503	MOUNT, Cable	
35	93109687	STANDOFF, Spacer	
	92021741	LABEL, Fault Code	See Note 12

- NOTE 1: S/C 25 & Blw all except BZ5A1E/G/T/U, BZ9A1C/E/F/N.
- NOTE 2: S/C 26 & Abv all except BZ5A1E/G/T/U, BZ5W1G/H, BZ9A1C/E/F/N, BZ9A7T/U/V
- NOTE 3: S/C 25 & below all except BZ5A1J/K/R/S, BZ5A2C/D/E/F/G/H, BZ5A5J, BZ5A6C/D, BZ9A1J/K, BZ9A2C/D, BZ9A6C/D.
- NOTE 4: S/C 26 & Abv all except BZ5A1J/K/R/S, BZ5A2C/D/E/F/G/H, BZ5A5J, BZ5A6C/D, BZ5A9G/H, BZ9A2C/D, BZ9A6C/D, BZ9A7C/D.
- NOTE 5: S/C 25 & Blw BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D.
- NOTE 6: S/C 26 & Abv BZ5A2E/F, BZ5A6C/D, BZ5A9G/H, BZ5W1E/F, BZ9A2C/D, BZ9A6C/D, BZ9A7C/D/P/R.
- NOTE 7: All except BZ5A1F.
- NOTE 8: S/C 25 & Blw all except BZ5A1J/K/R/S, BZ5A2C/D/G/H, BZ5A5J, BZ9A1J/K.
- NOTE 9: S/C 26 & Abv all except BZ5A1J/K/R/S, BZ5A2C/D/G/H, BZ5A5J. S/C 01 & Abv BZ9A1J/K.
- NOTE 10: BZ5A9G/H, BZ5W1E/F, BZ9A7C/D/P/R.
- NOTE 11: S/C 26 & Abv BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D.
- NOTE 12: BZ5A1A/B/H/L, BZ5A2A/B/J, BZ5A3A/B, BZ5A4A/B, BZ5A5A/B, BZ5A6A/B, BZ5A9E/F/J/K/N/P/R, BZ5W1A/B, BZ9A1A/B/Y/Z, BZ9A2A/B, BZ9A3A/B, BZ9A4A/B, BZ9A5A/B, BZ9A6A/B, BZ9A7G/L/W/Y, BZ9A9C/D only.



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Figure 5-4. Front Panel Assembly

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-4	73043902	FRONT PANEL ASSEMBLY	S/C 25 & Blw BZ5A1E,BZ9A1C
5-4	73043903	FRONT PANEL ASSEMBLY	S/C 26 & Abv BZ5A1E,BZ9A1C
1		NOT USED	
2	94394305	LENS, Blank	S/C 25 & Blw
2	94394311	LENS, Blank	S/C 26 & Abv
3	##	INDICATOR, LED	
4	##	SWITCH, P.B. W/LED Indicator	
5	10127112	SCREW, PHH PNH Mach, 6-32 x 5/16	
6	10126401	LOCKWASHER, #6	
7	94398701	BRACKET, Mounting	
8	##	AIR FILTER, Foam	
9	10127142	SCREW, PHH PNH Mach, 10-32 x 3/8	
10	09040204	LOCKWASHER	
11	73043400	BRACKET	
12	10127343	SCREW, PHH PNH Mach, 6-32 x 2	
13	10125803	LOCKWASHER, #6	
14	10125605	WASHER, #6	
15	94222501	FINGER GUARD	
16	##	FAN ASSEMBLY	
17	94277503	BASE, Mounting	
18	51906003	CONNECTOR, Plug	
19	51906207	CONTACT, Socket	
20	94277409	CABLE TIE	
21	94277400	CABLE TIE	
22	73035102	HARNESS ASSEMBLY	
23	73043800	PANEL, CONTROL	
24	73067200	GROUND WIRE ASSEMBLY	S/C 20 & Abv only
25	10126103	LOCKWASHER, #6	S/C 20 & Abv only

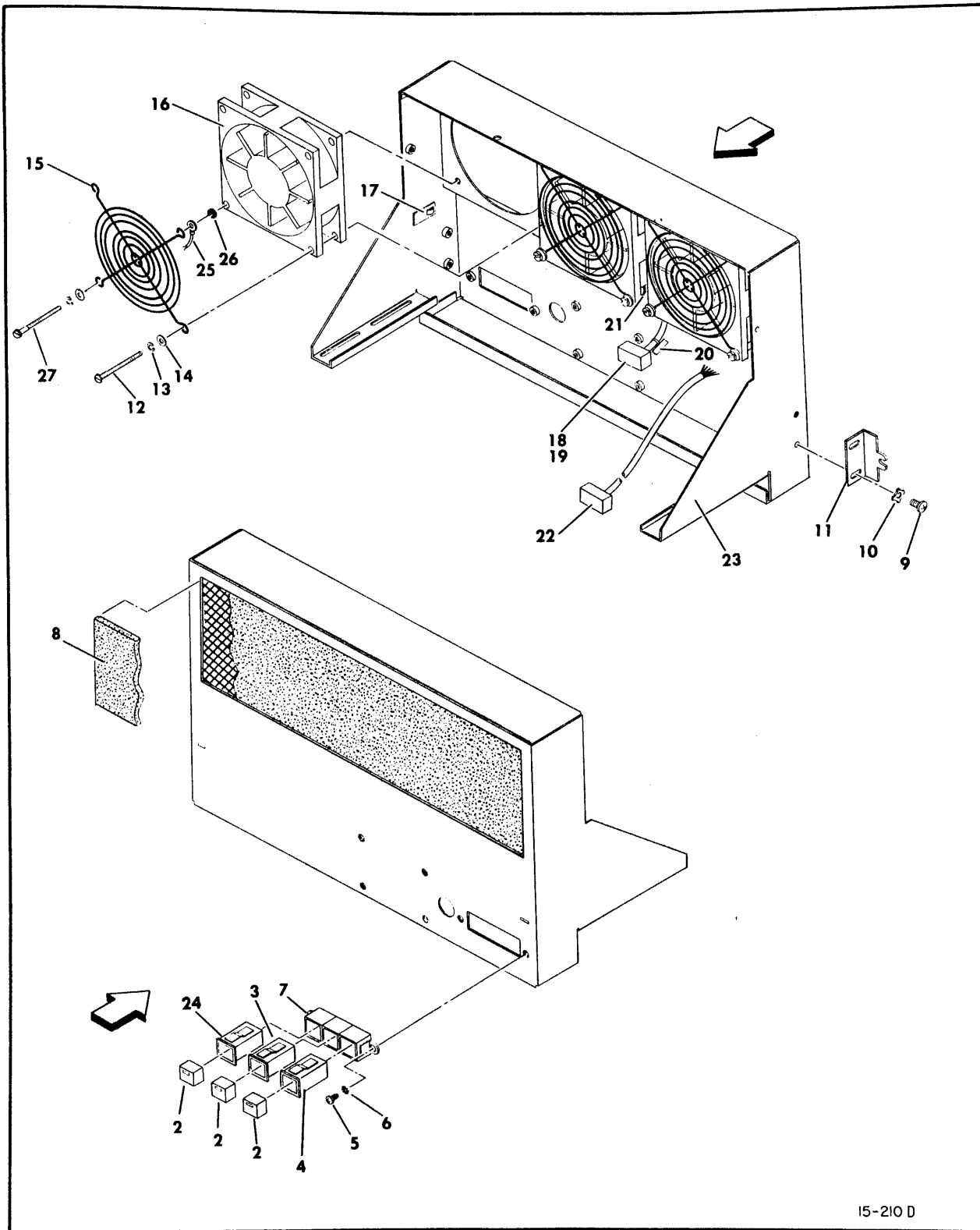
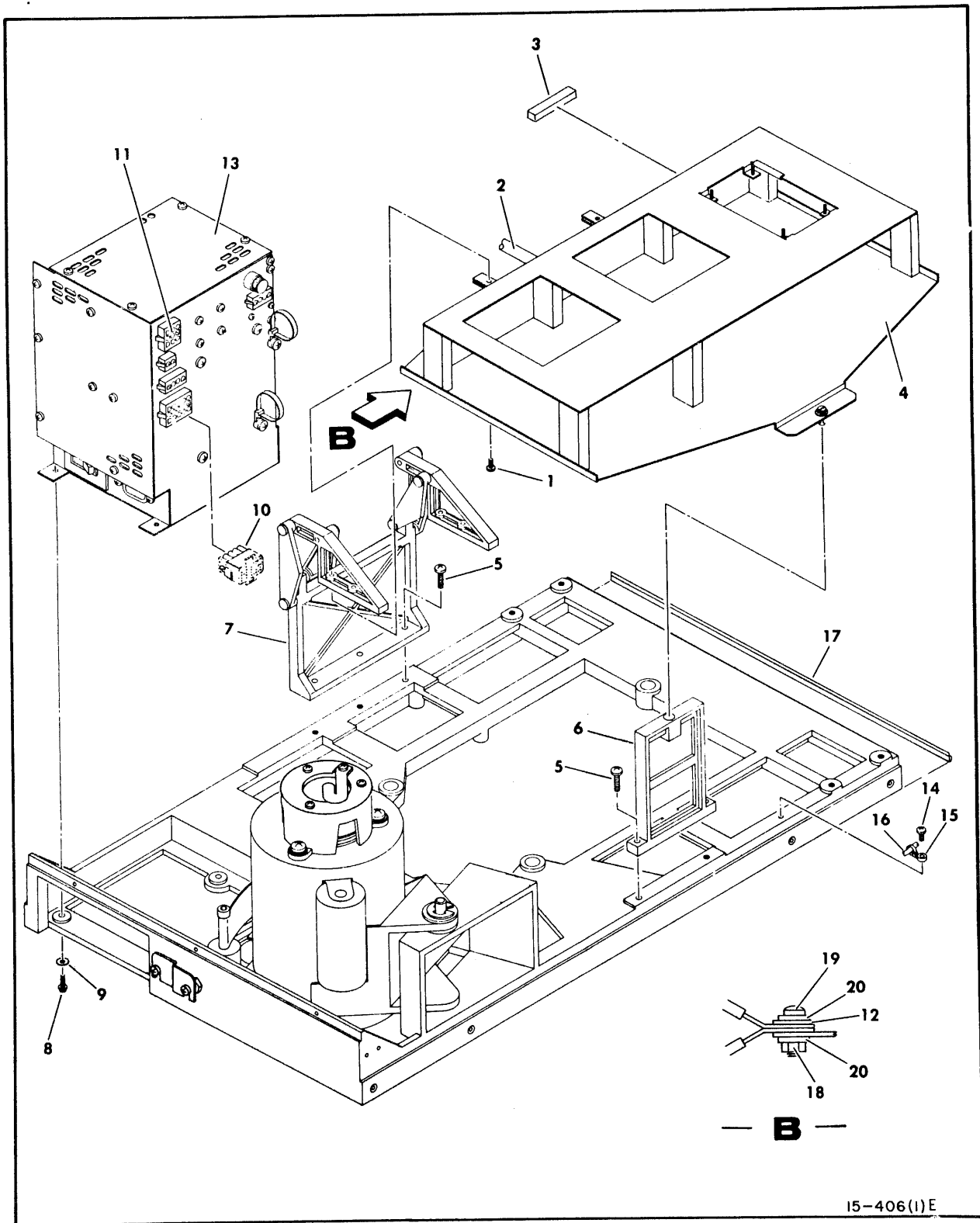


Figure 5-5. Front Panel Assembly

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-5	73067300	FRONT PANEL ASSEMBLY	S/C 25 & Blw BZ5A1G/T/U, BZ9A1E/F/N
5-5	73067301	FRONT PANEL ASSEMBLY	S/C 26 & Abv BZ5A1G/T/U, BZ9A1E/F/N
1		NOT USED	
2	94394305	LENS, Blank	S/C 25 & Blw
2	94394311	LENS, Blank	S/C 26 & Abv
3	##	SWITCH, P.B. W/LED Indicator	
4	94394007	SWITCH, P.B. W/LED Indicator	S/C 25 & Blw
4	94394030	SWITCH, P.B. W/LED Indicator	S/C 26 & Abv
5	10127112	SCREW, PHH PNH Mach, 6-32 x 5/16	
6	10126401	LOCKWASHER, #6	
7	94398702	BRACKET, Mounting	
8	##	AIR FILTER, Foam	
9	10127142	SCREW, PHH PNH Mach, 10-32 x 3/8	
10	09040204	LOCKWASHER	
11	73043400	BRACKET	
12	93724162	SCREW, PHH Mach, 6-32 x 1 7/8	
13	10125803	LOCKWASHER, #6	
14	10125605	WASHER, #6	
15	94375401	FINGER GUARD	
16	##	FAN ASSEMBLY	
17	94277503	BASE, Mounting	
18	51906003	CONNECTOR, Plug	
19	51906200	CONTACT, Socket	
20	94277409	CABLE TIE	
21	94277400	CABLE TIE	
22	73035100	HARNESS ASSEMBLY	
23	73062401	PANEL, Control	
24	##	INDICATOR, LED	
25	73067200	GROUND WIRE ASSEMBLY, Fan	
26	10126103	LOCKWASHER, #6	
27	10127343	SCREW, PHH PNH Mach, 6-32 x 2	

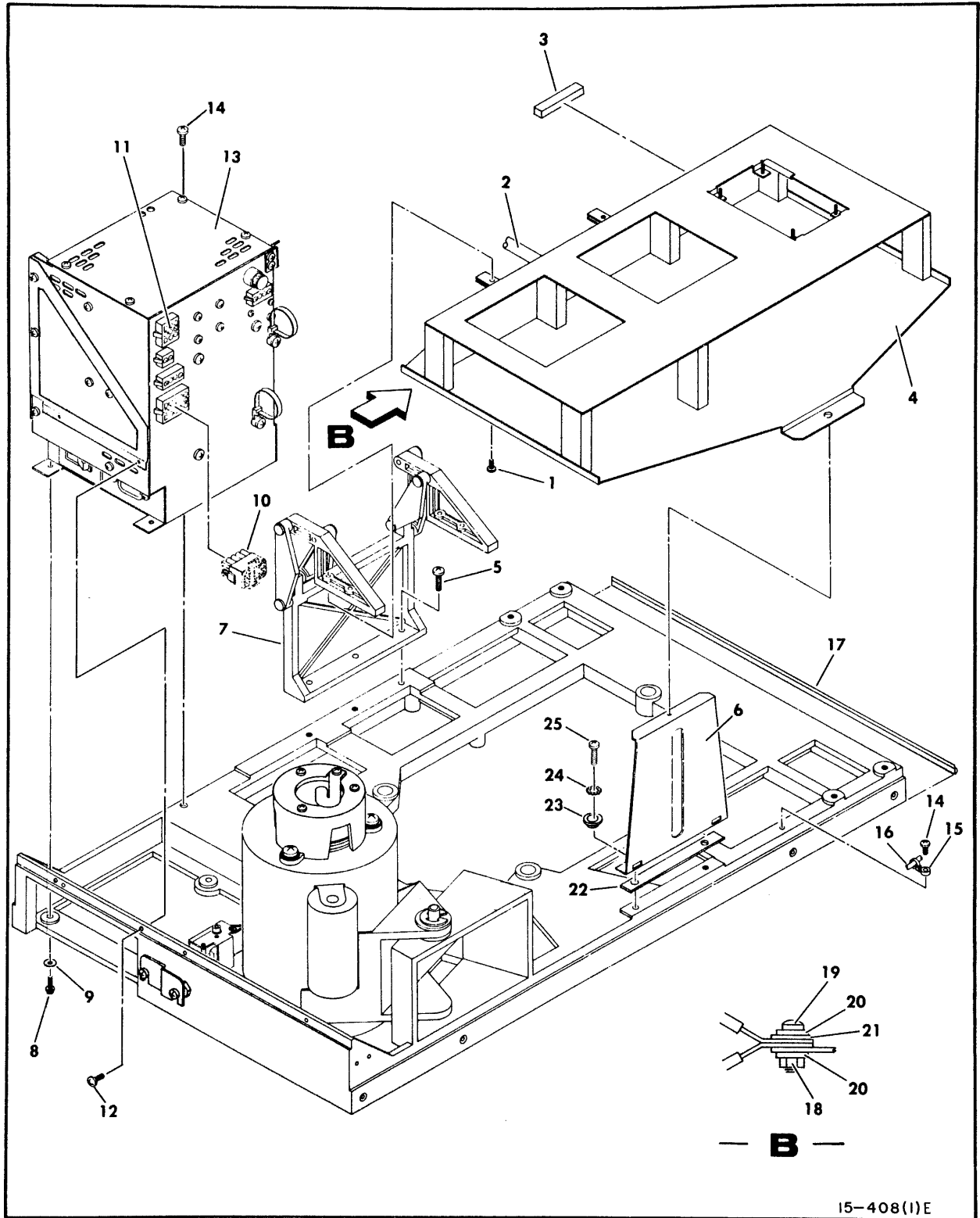


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Figure 5-6. Base Frame Assembly (Sheet 1 of 2)
Series Code 20 and Below

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-6	730354XX	BASE FRAME ASSEMBLY (Sheet 1 of 2)	S/C 20 & Blw
1	94375824	SCREW, TF, 8-16 x 3/8	
2	73054301	MAIN HARNESS ASSEMBLY	S/C 19 & Blw
2	73054302	MAIN HARNESS ASSEMBLY	S/C 20
3	77612623	CONNECTOR, Jumper	80 MB units
4		LOGIC CHASSIS ASSEMBLY (See Figure 5-8)	
5	10127134	SCREW, PHH PNH Mach, 10-24 x 3/4	
6	73017400	SUPPORT, Frame	
7	73020100	CHASSIS HINGE ASSEMBLY	
8	17901517	SCREW, PHH, 8-32 x 1/2	
9	10126402	LOCKWASHER, #8	
10	70117600	POWER SELECTOR PLUG	60 Hz units
10	70117605	POWER SELECTOR PLUG	50 Hz units
11	73055500	LOGIC DC CABLE ASSEMBLY	S/C 15 & Blw
11	73055501	LOGIC DC CABLE ASSEMBLY	S/C 16-19
11	73055502	LOGIC DC CABLE ASSEMBLY	S/C 20
12	10125605	WASHER #6	S/C 20 only
13		POWER SUPPLY ASSEMBLY (See Figure 5-10)	
14	10127122	SCREW, PHH PNH Mach, 8-32 x 3/8	
15	94277406	CABLE TIE	
16	73034100	CABLE, Fan	S/C 19 & Blw
16	73047001	CABLE, Fan	S/C 20
17	94374902	CONTACT STRIP	
18	10125105	NUT, Hex, 6-32	S/C 20 only
19	10127113	SCREW, PHH PNH, Mach, 6-32 x 3/8	S/C 20 only
20	10126103	LOCKWASHER, #6	S/C 20 only

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-6		BASE FRAME ASSEMBLY (Sheet 2)	S/C 20 & Blw
1	92033326	RING, Retaining	
2	73010400	WASHER	
3	10125303	NUT, Hex, 3/8-16	
4	10126108	LOCKWASHER, 3/8	
5	10125610	WASHER, 3/8	
6	73010500	PIN, Pivot	
7	89258100	WASHER, Thrust	
8	94291039	BEARING, Thrust	
9		MOTOR AND BRAKE ASSEMBLY (See Figure 5-9)	
10	10127122	SCREW, PHH PNH Mach, 8-32 x 3/8	
11	94277406	CABLE TIE	
12	93592200	SCREW, Slftpg, 8-32 x 3/8	
13	10126402	LOCKWASHER, #8	
14	10125727	SCREW, Flat Hd, 8-32 x 3/4	
15	73012600	SCREW, Motor Lock	
16	93707052	SCREW, Sch Shldr, 3/8 x 1 1/4	
17	94390403	SPRING, Constant Force	
18	73010900	SPOOL, Spring	
19	10127134	SCREW, PHH PNH Mach, 10-24 x 3/4	
20	10126403	LOCKWASHER, #10	
21	75164900	BAR, Ground	
22	75164800	STUD, Hex Hd	
23	92615008	WASHER, Shoulder	
24	10125607	WASHER, #10	
25	10125107	NUT, Hex, 10-24	
26	94274140	TERMINAL, Quick Connect	
27	73023901	FRAME, Base	
	94277400	CABLE TIE	



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Figure 5-7. Base Frame Assembly (Sheet 1 of 2)
Series Code 21 and Above

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-7	730354XX	BASE FRAME ASSEMBLY (Sheet 1 of 2)	S/C 21 & Abv
1	94375824	SCREW, TF, 8-16 x 3/8	
2	73054302	MAIN HARNESS ASSEMBLY	
3	77612623	CONNECTOR, Jumper	80 MB units
4		LOGIC CHASSIS ASSEMBLY (See Figure 5-8)	
5	10127134	SCREW, PHH PNH Mach, 10-24 x 3/4	
6	73069500	SUPPORT, Frame	
7	73020100	CHASSIS HINGE ASSEMBLY	
8	17901517	SCREW, PHH, 8-32 x 1/2	
9	10126402	LOCKWASHER, #8	
10	70117600	POWER SELECTOR PLUG	120V-60 Hz units
10	70117605	POWER SELECTOR PLUG	220V-50 Hz units
10	70117606	POWER SELECTOR PLUG	240V-50 Hz units
10	70117609	POWER SELECTOR PLUG	240V-60 Hz units
11	73055502	LOGIC DC CABLE ASSEMBLY	
12	10125712	SCREW, Flat Hd, 6-32 x 1/4	S/C 23 & Abv only
13		POWER SUPPLY ASSEMBLY (See Figure 5-10)	
14	10127122	SCREW, PHH PNH Mach, 8-32 x 3/8	
15	94277406	CABLE TIE	
16	73067003	CABLE, Fan	
17	94374902	CONTACT STRIP	
18	10125105	NUT, Hex, 6-32	
19	10127113	SCREW, PHH PNH, Mach, 6-32 x 3/8	
20	10126103	LOCKWASHER, #6	
21	10125605	WASHER, #6	
22	92001404	INSULATOR	
23	94347110	WASHER, Shoulder	
24	10126403	LOCKWASHER, #10	
25	10127132	SCREW, PHH PNH Mach, 10-24 x 1/2	

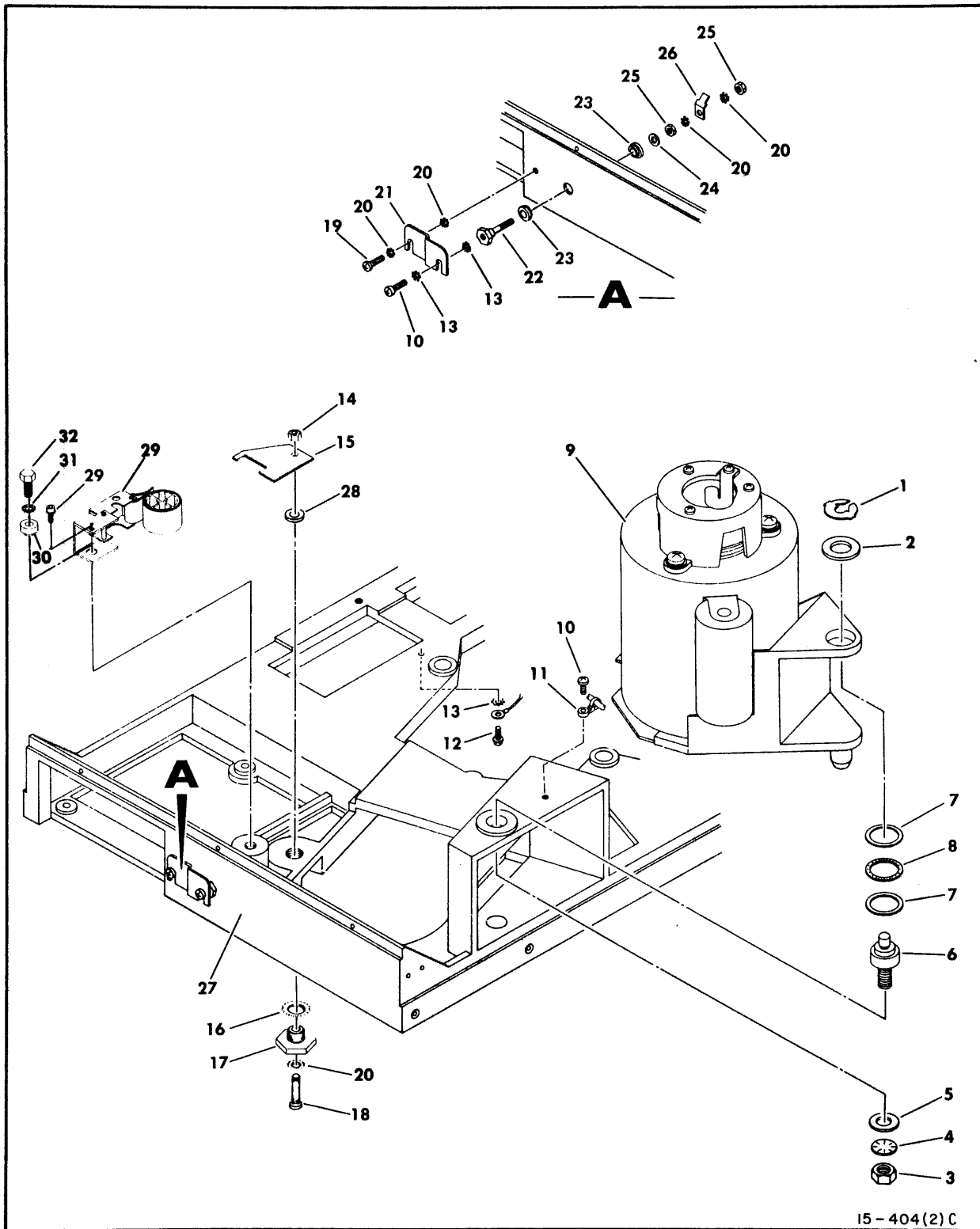
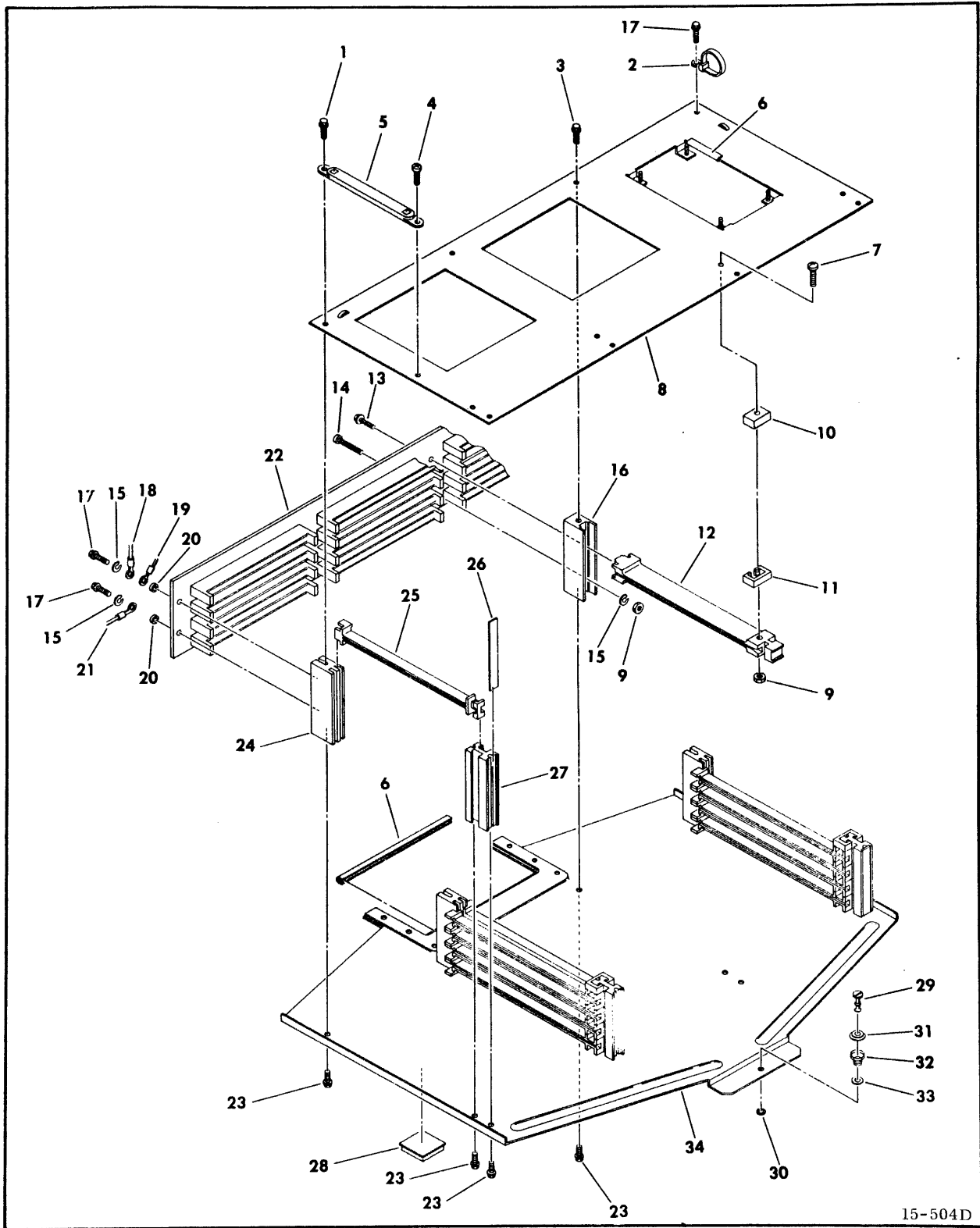


Figure 5-7. Base Frame Assembly (Sheet 2 of 2)
Series Code 21 and Above

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-7		BASE FRAME ASSEMBLY (Sheet 2)	S/C 21 & Abv
1	92033326	RING, Retaining	
2	73010400	WASHER	
3	10125303	NUT, Hex, 3/8-16	
4	10126108	LOCKWASHER, 3/8	
5	10125610	WASHER, 3/8	
6	73010500	PIN, Pivot	
7	89258100	WASHER, Thrust	
8	94291039	BEARING, Thrust	
9		MOTOR AND BRAKE ASSEMBLY (See Figure 5-9)	
10	10127122	SCREW, PHH PNH Mach, 8-32 x 3/8	
11	94277406	CABLE TIE	
12	93592200	SCREW, Slftpg, 8-32 x 3/8	
13	10126402	LOCKWASHER, #8	
14	94218005	NUT, Slflkg, 10-32	
15	73071000	MOTOR LOCK PLATE	
16	10126408	LOCKWASHER, 1/2	
17	73071100	MOTOR LOCK SCREW	
18	10126248	SCREW, SCH, 10-32 x 1	
19	10127134	SCREW, PHH PNH Mach, 10-24 x 3/4	
20	10126403	LOCKWASHER, #10	
21	75164900	BAR, Ground	
22	75164800	STUD, Hex Hd	
23	92615008	WASHER, Shoulder	
24	10125607	WASHER, #10	
25	10125107	NUT, Hex, 10-24	
26	94274140	TERMINAL, Quick Connect	
27	73023901	FRAME, Base	S/C 21-22
27	73023902	FRAME, Base	S/C 23 & Abv
28	93564060	WASHER, Nylon	
29	73070300	SPRING ASSEMBLY	
30	73069300	BUSHING	
31	10126405	LOCKWASHER, 5/16	
32	10126515	SCREW, Hex Hd, 5/16-18 x 3/4	
	94277400	CABLE TIE	

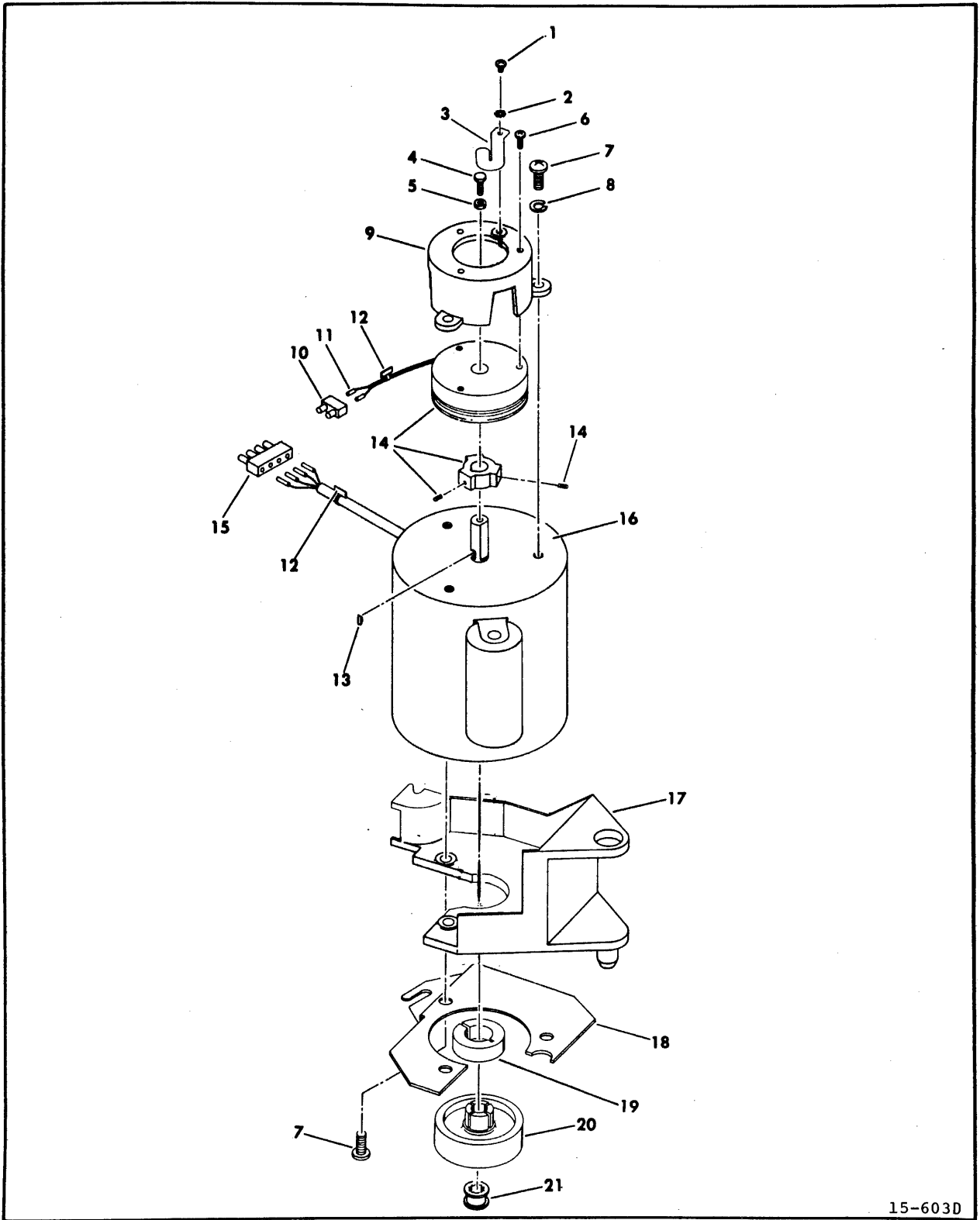


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Figure 5-8. Logic Chassis Assembly

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-8	730329XX	LOGIC CHASSIS ASSEMBLY	
1	93592202	SCREW, Slftpg, 8-32 x 1/2	
2	94277406	CABLE TIE	
3	93592200	SCREW, Slftpg, 8-32 x 3/8	
4	10127121	SCREW, PHH PNH Mach, 8-32 x 5/16	
5	94386407	CABLE MOUNT	
6	94385500	GROMMET, Extruded	
7	92742213	SCREW, PNH Mach, 8-32 x 1 3/8	
8	73033800	PLATE	
9	10125106	NUT, Hex, 8-32	
10	73053601	SPACER	
11	82316701	SPACER	
12	82314500	GUIDE, Card	
13	92002837	SCREW, Hex Washer Hd Sh Met, 8-18 x 1 1/4	
14	10127127	SCREW, PHH PNH Mach, 8-32 x 1	
15	10125804	LOCKWASHER, #8	
16	82319801	BAR, Mounting	
17	93592204	SCREW, Slftpg, 8-32 x 1/2	
18	94369543	GROUND CABLE	
19	94281404	GROUND CABLE	
20	93109121	SPACER	
21	94369538	GROUND CABLE	
22	73052921	WIRE WRAP ASSEMBLY	All except BZ5A1V/W, BZ5A2E/F, BZ5A5G/H, BZ5A6C/D, BZ9A1J/K/L/M, BZ9A2C/D, BZ9A5E/F, BZ9A6C/D/E/F,
22	73052922	WIRE WRAP ASSEMBLY	BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D/E/F
22	73052923	WIRE WRAP ASSEMBLY	BZ5A1V/W, BZ5A5G/H
22	73052924	WIRE WRAP ASSEMBLY	BZ9A1J/K/L/M, BZ9A5E/F
23	18862722	SCREW, Hex Hd, 8-32 x 3/8	
24	82316501	BAR, Support	
25	82311701	GUIDE, Card	

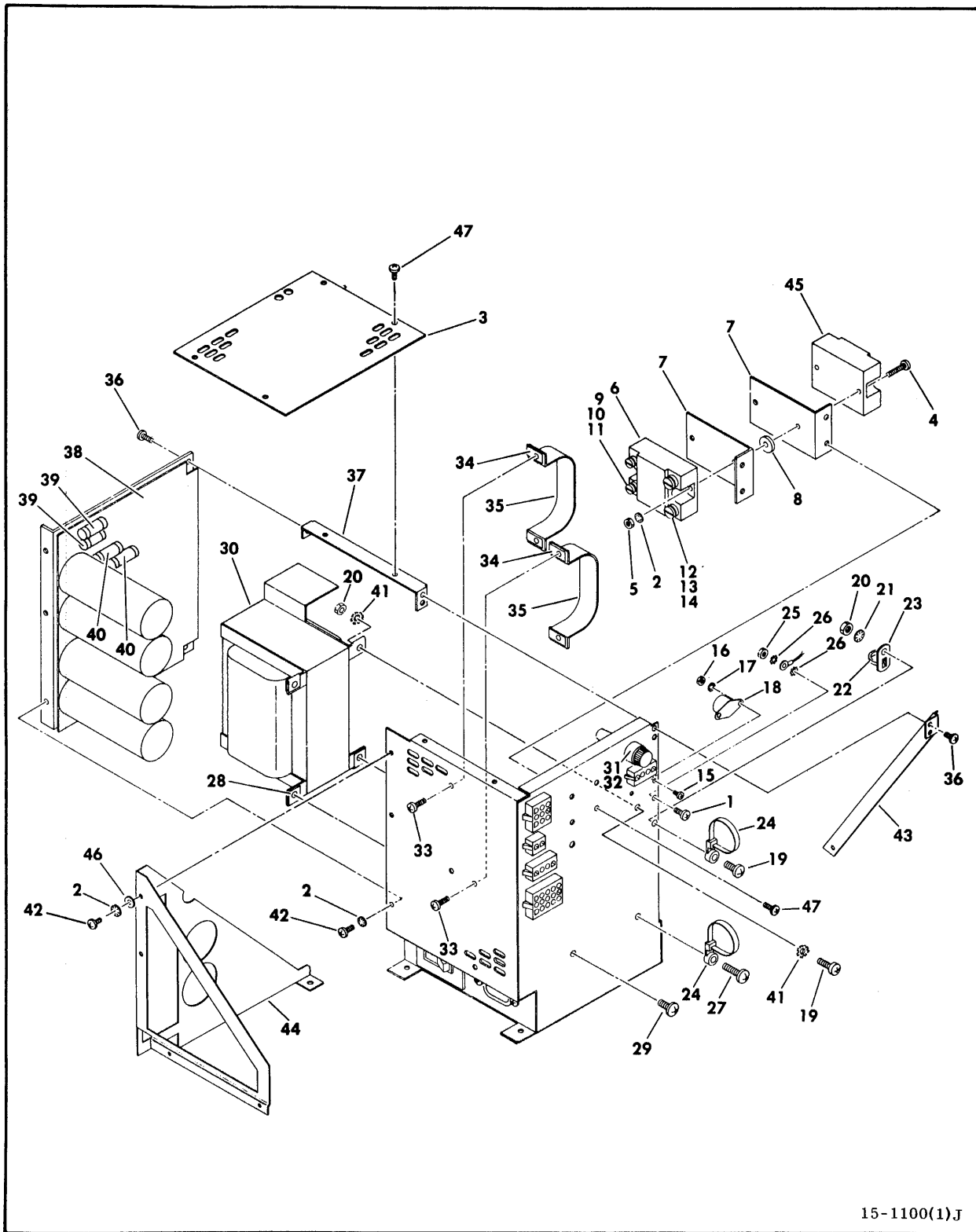
INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-8		LOGIC CHASSIS ASSEMBLY (Contd)	
26	82311806	STRIP, Card Location	
27	82316601	BAR, Mounting	
28	51805800	BUMPER, Self-Stick	
29	95635729	FASTENER, 1/4 Turn	S/C 20 & Blw only
30	94317900	RING, Retaining	S/C 20 & Blw only
31	94379800	FERRULE	S/C 20 & Blw only
32	94379801	SPRING	S/C 20 & Blw only
33	94379802	WASHER	S/C 20 & Blw only
34	73017300	PLATE, Support	S/C 20 & Blw
34	82394100	PLATE, Support	S/C 21 & Abv



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Figure 5-9. Motor and Brake Assembly

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-9	##	MOTOR AND BRAKE ASSEMBLY	
1	10127120	SCREW, PHH PNH Mach, 8-32 x 1/4	
2	10126402	LOCKWASHER, #8	
3	##	SPRING, Antistatic	
4	73010700	SCREW, Antistatic	
5	10125108	NUT, Hex, 10-32	
6	93660079	SCREW, PHH, 8-32 x 1/2	
7	10127155	SCREW, PHH PNH Mach, 1/4-20 x 3/4	
8	10125806	LOCKWASHER, 1/4	
9	73032100	BRAKE HOUSING	
10	51906000	CONNECTOR, Plug	
11	51905807	CONTACT PIN	
12	94277409	CABLE TIE	
13	94006030	KEY	
14	##	KIT, Friction Brake	
15	51906002	CONNECTOR, Receptacle	
16	94398605	DRIVE MOTOR	120V Units
16	94398607	DRIVE MOTOR	220V/240V Units
17	47361400	BRACKET, Motor	
18	73054100	PLATE, Motor Mounting	S/C 20 & Blw
18	73070600	PLATE, Motor Mounting	S/C 21 & Abv
19	93287013	COLLAR, Shaft	S/C 17 & Abv
20	73005703	PULLEY	60 Hz, S/C 16 & Blw
20	73005704	PULLEY	50 Hz, S/C 16 & Blw
20	75166700	PULLEY	60 Hz, S/C 17 & Abv
20	75166701	PULLEY	50 Hz, S/C 17 & Abv
21	94250602	RING, Tolerance	S/C 16 & Blw



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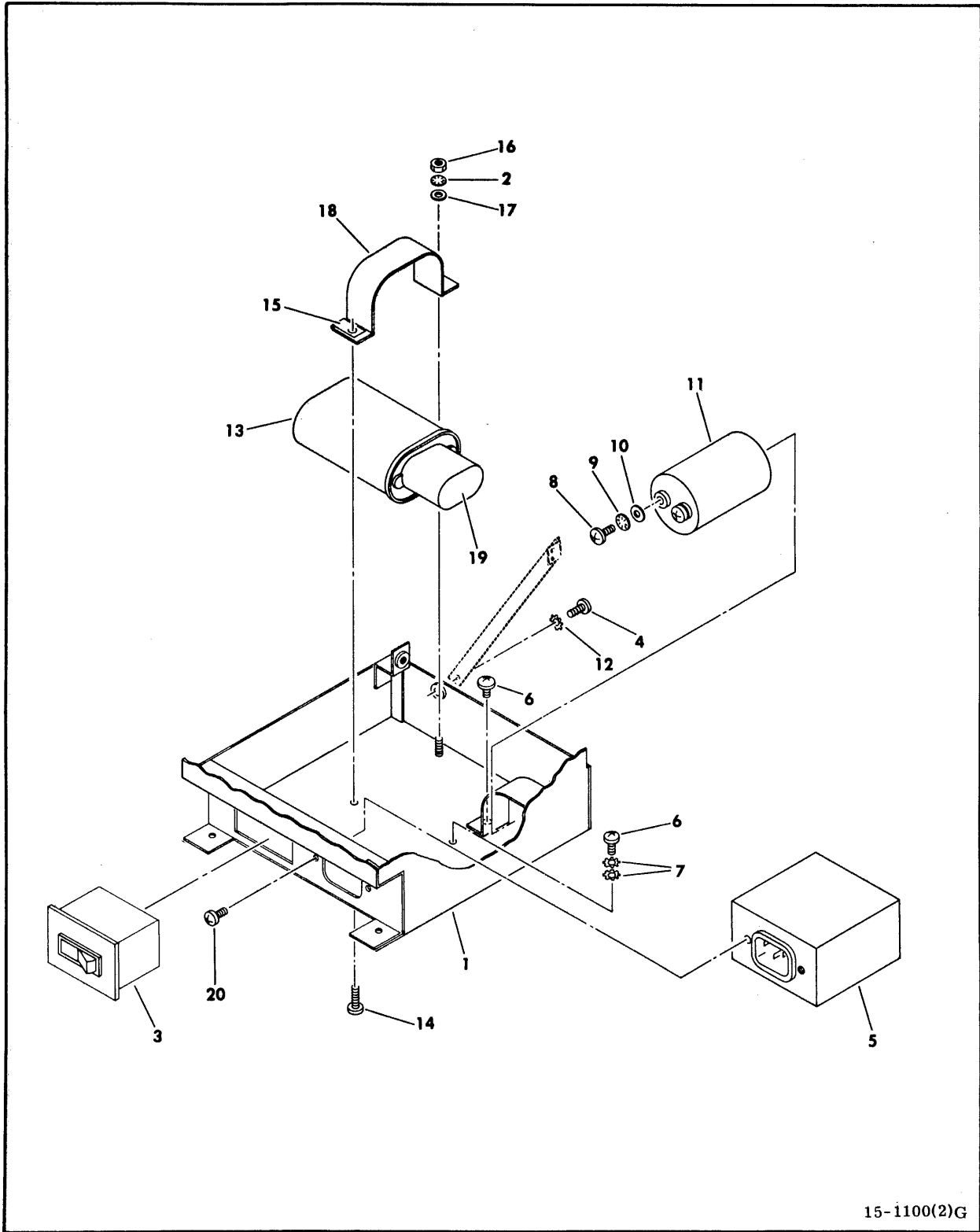
Figure 5-10. Power Supply Assembly (Sheet 1 of 2)

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-10	##	POWER SUPPLY ASSEMBLY (Sheet 1 of 2)	
1	10127113	SCREW, PHH PNH Mach, 6-32 x 3/8	
2	10126103	LOCKWASHER, #6	
3	70111700	COVER	
4	10127116	SCREW, PHH PNH Mach, 6-32 x 3/4	
5	10125105	NUT, Hex, 6-32	
6	95689304	RELAY (K1)	All except BZ5A1L,BZ9A7L
6	95689305	RELAY (K1)	BZ5A1L,BZ9A7L
7	70111900	BRACKET	
8	95797300	WASHER, Phenolic	
9	92751158	SCREW, PHH PNH Mach, 6-32 x 1/4	
10	95524401	LOCKWASHER, #6	
11	94047078	WASHER, Special	
12	92751196	SCREW, PHH PNH Mach, 8-32 x 1/4	
13	95524409	LOCKWASHER, #8	
14	94047079	WASHER, Special	
15	10127102	SCREW, PHH PNH Mach, 4-40 x 1/4	
16	95510024	NUT, Hex, 4-40	
17	10126101	LOCKWASHER, #4	
18	95673205	THERMOSTAT (S1)	
19	10127143	SCREW, PHH PNH Mach, 10-32 x 1/2	
20	10125108	NUT, Hex, 10-32	
21	95524408	LOCKWASHER, #10	
22	94277400	CABLE TIE	
23	94277503	BASE, Mounting	
24	94277406	CABLE TIE	
25	95510026	NUT, Hex, 6-32	
26	10126401	LOCKWASHER, #6	
27	95655545	SCREW, Sh Met, 10-16 x 3/4	
28	95634805	SPEEDNUT	
29	95655543	SCREW, Sh Met, 10-16 x 1/2	
30	76878100	TRANSFORMER (T1)	
31	##	FUSE, 5A, 250 V (F1)	

INDEX NO	PART NO	PART DESCRIPTION	NOTE
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5-10 POWER SUPPLY ASSEMBLY (Sheet 2
of 2)

32	24513502	FUSEHOLDER	
33	95655517	SCREW, Sh Met, 6-20 x 1/2	
34	95634801	SPEEDNUT	
35	47069601	CLAMP, Capacitor	
36	17901509	SCREW, PHH, 6-32 x 3/8	
37	70111800	BRACE	
38	##	DZYV COMPONENT ASSEMBLY	
39	95647604	FUSE, Fast-Blow, 5A (F2,F5)	
40	51650226	FUSE, Slow-Blow, 5A (F3,F4)	
41	10126403	LOCKWASHER, #10	
42	10127114	SCREW, PHH PNH Mach, 6-32 x 1/2	
43	73140800	BRACKET, Support	
44	73075000	BRACKET, Support	
45	95689304	RELAY (K2)	
46	10125613	WASHER, #6	
47	93749162	SCREW, PHH PNH Mach W/Lockwasher, 6-32 x 3/8	



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Figure 5-10. Power Supply Assembly (Sheet 2)

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-10		POWER SUPPLY ASSEMBLY (Sheet 2 of 2)	
1	76877701	CHASSIS	All except BZ9A7L
1	76877703	CHASSIS	BZ9A7L
2	10126103	LOCKWASHER, #6	
3	96837908	CIRCUIT BREAKER, 250 V (C1)	
4	10127113	SCREW, PHH PNH Mach, 6-32 x 3/8	
5	70118701	RFI FILTER ASSEMBLY (LF1)	
6	17901515	SCREW, PHH, 8-32 x 1/4	
7	10126402	LOCKWASHER, #8	
8	93234236	SCREW, PNH Mach, 10-32 x 5/16	
9	95524408	LOCKWASHER, #10	
10	94047081	WASHER, Special	
11	95645626	CAPACITOR, 40 V, 4700 μ F (C2)	
12	10126401	LOCKWASHER, #6	
13	95686705	CAPACITOR, 660 V, 3 μ F (C1)	
14	95655516	SCREW, Sh Met, 6-20 x 3/8	
15	95634801	SPEEDNUT	
16	95510026	NUT, Hex, 6-32	
17	10125613	WASHER, #6	
18	95643600	CLAMP, Capacitor	
19	95582500	BOOT	
20	93749162	SCREW, PHH PNH Mach W/Lockwasher, 6-32 x 3/8	
	92015100	COVER, Insulating	
	92006905	PLATE, Warning, Fuse	
	92006900	PLATE, Warning, High Voltage	

TABLE 5-1. HARDWARE KIT PIECE PARTS

Part Number	Part Description	Kit P/N						
		7 6 8 4 6 3 0 0	7 6 8 4 6 3 0 5	9 2 5 5 2 3 0 8	7 6 8 4 6 3 0 6	7 6 8 4 6 3 0 7	7 6 8 4 6 3 0 3	7 6 8 4 6 3 0 8
94386402	MOUNT, Cable	x	x	-	x	x	x	x
94277425	CABLE TIE	x	x	-	x	x	x	x
73040500	KEEPER, Latch	x	x	-	x	x	-	-
10125805	LOCKWASHER, #10	x	x	-	x	x	-	x
10127143	SCREW, PHH PNH Mach, 10-32 x 1/2	x	x	x	x	x	-	x
10125108	NUT, Hex, 10-32	x	x	x	x	x	-	-
##	TERMINATOR ASSEMBLY, AYDV CARD	-	x	-	-	-	x	x
73040501	KEEPER, Latch	-	-	x	-	-	-	-
10126502	SCREW, Hex Hd, 1/4-20 x 3/4	-	-	x	-	-	-	-
10125806	LOCKWASHER, 1/4	-	-	x	-	-	-	-
10125608	WASHER, 1/4	-	-	x	-	-	-	-
10126105	LOCKWASHER, #10	-	-	x	-	-	-	-
10126244	SCREW, SCH, 10-32 x 1/2	-	-	x	-	-	-	-
92602002	CLAMP, Cable	-	-	x	-	-	-	-
10125606	WASHER, #8 -	-	x	-	-	-	-	-
10126402	LOCKWASHER, #8	-	-	x	-	-	-	-
10125106	NUT, Hex, 8-32	-	-	x	-	-	-	-
10127122	SCREW, PHH PNH Mach, 8-32 x 3/8	-	-	x	-	-	-	-
10125607	WASHER, #10	-	-	x	-	-	-	-
73069600	BRACKET, Slide	-	-	x	-	-	-	-
73069601	BRACKET, Slide	-	-	x	-	-	-	-
70117605	JUMPER PLUG	-	-	-	-	x	-	-
81537401	"A" CABLE	-	-	-	-	-	-	x
92708901	"B" CABLE	-	-	-	-	-	-	x
80456390	NUT PLATE	x	x	-	-	-	-	-

NOTE: "x" SIGNIFIES PART IS IN THAT KIT.

SECTION 5B

SPARE PARTS LIST

GENERAL

The Spare Parts List serves as an aid in determining the interchangeability of assemblies and parts to be spared. An example of the columns used in the Spare Parts List is shown on the next page.

NOTE

The spare parts list establishes the support service level of the unit. Individual parts, assemblies, or components not on this list may be long lead time items subject to significant delays.

The Spare Parts List is divided into four columns:

Items Appear On - This column cross-references the part number in the spare

parts list to the associated figure number, page number, and index number in the illustrated parts breakdown.

Description - This column gives the name and a brief description of the part or assembly. This column also tracks series code history information.

Part Number and Replacement Part Number - These columns provide an eight-digit number. The difference between the two columns is that the Part Number column gives all the possible part numbers used for a particular part or assembly, while the Replacement Part Number column gives the interchangeable spare part number.

Notes - This column provides additional information such as Field Change Order (FCO), Special Purchase Order (SPO), serial number, and machine configuration.

EXAMPLE OF SPARE PARTS LIST

ENGINEERING RECOMMENDED SPARE PARTS LIST						
ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
3-11	3-37	25	CONTROL PANEL ASSEMBLY			
			Used S/C 14 and above	WWWW	XXXX	60 Hz units
			Used S/C 14 and above	YYYY	ZZZZ	50 Hz units

In the example above, the control panel assembly is referenced as index 25 on figure 3-11, which appears on page

3-37. The original part number for single-channel units was WWWWW; order part number XXXXX if it must be replaced.

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				

FFX COMP ASSY, Loc A2A01
BFFX - Used on S/C 09 & above 76935102 76935102

FEX COMP ASSY, Loc A2A03
AFEX - Used on S/C 09-11 76934700 76934705
BFEX - Used on S/C 12-16 76934702 76934705
EFEX - Used on S/C 17 & above 76934705 76934705

FAX COMP ASSY, Loc A2A04/A2B04
CFAX - Used on S/C 09 & above 76933107 76933107

BZ5A1C/D/E/F/
G/T/U/Z,
BZ5A9B/C/D/J/K/R,
BZ9A1C/E/F/J/K/L/
M/N/P/R/U/V/W,
BZ9A5E/F/G/H

FAX COMP ASSY, Loc A2A04/A2B04
CFAX - Used on S/C 09-23 76933107 76933120
MFAX - Used on S/C 24 & above 76933120 76933120

BZ5A1A/B/L, BZ5A2A/
B, BZ5A3A/B, BZ5A4A/
B, BZ5A5A/B/D/F/K/
L, BZ5A6A/B, BZ5A9N/
P, BZ9A1A/B, BZ9A2A/
B, BZ9A3A/B, BZ9A4A/
B, BZ9A5A/B, BZ9A6A/
B, BZ9A7C/D/E/F/L/
M

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
			_FAX COMP ASSY, Loc A2A04/A2B04			BZ5A1H/V/W, BZ5A2J, BZ5A5G/H, BZ5A9E/F/G/H/L/M, BZ9A1G/H/S/T/Y/Z, BZ9A5C/D, BZ9A7A/B/G
			DFAX - Used on S/C 14 & above	76933108	76933108	
			_FAX COMP ASSY, Loc A2A04/A2B04			BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D
			JFAX - Used on S/C 14 & above	76933112	76933112	
			_FAX COMP ASSY, Loc A2A04/A2B04			BZ9A6E/F
			RFAX - Used on S/C 24 & above	76933126	76933126	
			_FAX COMP ASSY, Loc A2A04/A2B04			BZ5A1J/K/R/S, BZ5A2C/D/G/H, BZ5A5J
			LFAX - Used on S/C 15 & above	76933116	76933116	
			_KBX COMP ASSY, Loc A2B01/A2C01			80 MB units all except BZ5A1V/W, BZ5A5G/H
			AJFX - Used on S/C 09-12	76963900	76971905	To EKBX-FCO 50659
			AKBX - Used on S/C 13	76971900	76971905	To EKBX-FCO 50659
			DKBX - Used on S/C 14	76971904	76911905	To EKBX-FCO 50659
			EKBX - Used on S/C 15 & above	76971905	76971905	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
			<u>FAX COMP ASSY, Loc A2A04/A2B04</u>			BZ5A1J/K/R/S, BZ5A2 C/D/G/H, BZ5A5J
			LFAX - Used on S/C 15-30	76933116	76933134	
			ZFAX - Used on S/C 31 & sbove	76933134	76933134	
			<u>FAX COMP ASSY, Loc A2A04/A2B04</u>			BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D
			JFAX - Used on S/C 14-28	76933112	76933136	
			RFAX - Used on S/C 29-30	76933126	76933136	
			ABFAX - Used on S/C 31 & above	76933136	76933136	
			<u>FAX COMP ASSY, Loc A2A04/A2B04</u>			BZ9A6E/F
			RFAX - Used on S/C 24-30	76933126	76933136	
			ABFAX - Used on S/C 31 & above	76933136	76933136	
			<u>FAX - COMP ASSY, Loc A2A04/A2B04</u>			BZ9A7E/F, BZ9A9G/H
			CFAX - Used on S/C 23 & below	76933107	76933140	
			MFAX - Used on S/C 24-30	76933120	76933140	
			AFFAX - Used on S/C 31 & above	76933140	76933140	
			<u>KBX COMP ASSY, Loc A2B01/A2C01</u>			80 MB units all except BZ5A1V/W, BZ5A5G/H
			AJFX - Used on S/C 09-12	76963900	76971912	To EKBX-FCO 50659
			AKBX - Used on S/C 13	76971900	76971912	To EKBX-FCO 50659
			DKBX - Used on S/C 14	76971904	76911912	To EKBX-FCO 50659
			EKBX - Used on S/C 15-30	76971905	76971912	
			MKBX - Used on S/C 31 & above	76971912	76971912	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
			KBX COMP ASSY, Loc A2B01/A2C01			BZ5A1V/W, BZ5A5G/H
-			AKBX - Used on S/C 13	76971900	76971913	To HKBX-FCO 50967
			DKBX - Used on S/C 14	76971904	76971913	To HKBX-FCO 50967
			EKBX - Used on S/C 15-19	76971905	76971913	To HKBX-FCO 50967
			HKBX - Used on S/C 20-30	76971908	76971913	
			NKBX - Used on S/C 31 & above	76971913	76971913	
			KBX COMP ASSY, Loc A2B01/A2C01			160 MB units
-			AJFX - Used on S/C 09-12	76963900	76971915	
			AKBX - Used on S/C 13	76971900	76971915	
			CKBX - Used on S/C 14-18	76971903	76971915	
			GKBX - Used on S/C 19-24	76971907	76971915	
			LKBX - Used on S/C 25-30	76971911	76971915	
			QKBX - Used on S/C 31 & above	76971915	76971915	
			FGX COMP ASSY, Loc A2B02/A2C02			80 MB units
-			BFGX - Used on S/C 09-12	76935501	76935523	To WFGX-FCO 62212
			HFGX - Used on S/C 13-17	76935508	76935523	To WFGX-FCO 62212
			TFGX - Used on S/C 18-21	76935518	76935523	To WFGX-FCO 62212
			WFGX - Used on S/C 22 & above	76935523	76935523	
			FGX COMP ASSY, Loc A2B02/A2C02			160 MB units
-			EFGX - Used on S/C 13-17	76935505	76935524	To XFGX-FCO 62213
			SFGX - Used on S/C 18-21	76935517	76935524	To XFGX-FCO 62213
			XFGX - Used on S/C 22 & above	76935524	76935524	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
_JBX COMP ASSY, Loc A2B03						80 MB units
			CFCX - Used on S/C 09-12	76933903	76962328	To RJBX-FCO 62112
			AJBX - Used on S/C 13-14	76962300	76962328	To RJBX-FCO 62112
			FJBX - Used on S/C 15	76962306	76962328	To RJBX-FCO 62112
			JJBX - Used on S/C 16-21	76962309	76962328	To RJBX-FCO 62112
			RJBX - Used on S/C 22-23	76962316	76962328	
			YJBX - Used on S/C 24-26	76962323	76962328	
			ADJBX - Used on S/C 27 & above	76962328	76962328	
_JBX COMP ASSY, Loc A2B03						160 MB units all except BZ9A7P/R
			EFCX - Used on S/C 09-12	76933906	76962329	To VJBX-FCO 62142
			AJBX - Used on S/C 13	76962300	76962329	To VJBX-FCO 62142
			DJBX - Used on S/C 14-16	76962303	76962329	To VJBX-FCO 62142
			MJBX - Used on S/C 17-22	76962312	76962329	To VJBX-FCO 62142
			VJBX - Used on S/C 23	76962320	76962329	
			ZJBX - Used on S/C 24-26	76962324	76962329	
			AEJBX - Used on S/C 27 & above	76962329	76962329	
_JBX COMP ASSY, Loc A2B03						BZ9A7P/R
			AEJBX - Used on S/C 29-34	76962329	76962333	
			AHJBX - Used on S/C 35 & Above	76962333	76962333	
_HNX COMP ASSY, Loc A2C03						BZ9A1J/K/L/M, BZ9A5E/F only
			EHNX - Used on S/C 09 & above	76957106	76957106	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON Fig. Page Index No. No. No.	DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
	JUMPER PLUG ASSEMBLY (A2C04) Used on S/C 09 & above	47203102	47203102	Single Chan units
	<u>_</u> FBX COMP ASSY, Loc A2C04 AFBX - Used on S/C 09 & above	76933500	76933500	Dual Chan units All except BZ5A2C/D/E/F/G/H, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D
	CFBX - Used on S/C 14-20	76933504	76933508	BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D
	DFBX - Used on S/C 15 & above	76933505	76933505	BZ5A2C/D/G/H
	FFBX - Used on S/C 21 & above	76933508	76933508	BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D/ E/F
	<u>_</u> ZSV COMP ASSY, Loc A2C05 AZSV - Used on S/C 09-12 BZSV - Used on S/C 13-18 CZSV - Used on S/C 19 & above	54286500 54286501 54286502	54286502 54286502 54286502	To BZSV-FCO 50591
	<u>_</u> DZV COMP ASSY, Loc A3A1 ADZV - Used on S/C 09 & above	54209300	54209300	
	<u>_</u> NSN COMP ASSY, Loc A4A1 BNSN - Used on S/C 09-28 CNSN - Used on S/C 29 & above	54086501 54086502	54086502 54086502	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-2	5-11	10	MINI MODULE ASSEMBLY (80 MB)			Moveable Heads except BZ5A9C/D
			Used on S/C 09-22	73034601	82397104	
			Used on S/C 23-24	73034616	82397104	
			Used on S/C 25 & above	82397104	82397104	
5-2	5-11	10	MINI MODULE ASSEMBLY (80 MB)			BZ5A9C/D
			Used on S/C 09-22	73034601	82397114	
			Used on S/C 23-24	73034616	82397114	
			Used on S/C 25	82397104	82397114	
			Used on S/C 26 & above	82397114	82397114	
5-2	11		MINI MODULE ASSEMBLY (80 MB)			Moveable + 48 Fixed Heads
			Used on S/C 09-22	73034602	82397105	
			Used on S/C 23-24	73034617	82397105	
			Used on S/C 25 & above	82397105	82397105	
5-2	5-11	10	MINI MODULE ASSEMBLY (80 MB)			Moveable + 96 Fixed Heads except BZ5A5G/H, BZ5A9E/F
			Used on S/C 09-22	73034603	82397106	
			Used on S/C 23-24	73034618	82397106	
			Used on S/C 25 & above	82397106	82397106	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-2	5-11	10	MINI MODULE ASSEMBLY (80 MB)			BZ5A5G/H
			Used on S/C 09-22	73034603	82397103	
			Used on S/C 23-24	73034618	82397103	
			Used on S/C 25 & above	82397103	82397103	
5-2	5-11	10	MINI MODULE ASSEMBLY (80 MB)			BZ5A9E/F
			Used on S/C 09-22	73034603	82397101	
			Used on S/C 23-24	73034618	82397101	
			Used on S/C 25 & above	82397101	82397101	
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			Moveable Heads except BZ9A1J/K/P/R Y/Z, BZ9A7G
			Used on S/C 09-16	73034604	82395200	Replacement re- quires LKBX card
			Used on S/C 17-22	73034607	82395200	Replacement re- quires LKBX card
			Used on S/C 23-24	73034613	82395200	Replacement re- quires LKBX card
			Used on S/C 25 & above	82395200	82395200	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-2	5-11	10	MINI MODULE ASSEMBLY (80 MB)			Moveable + 96 Fixed Heads except BZ5A5G/H, BZ5A9E/F
			Used on S/C 09-22	73034603	82397106	
			Used on S/C 23-24	73034618	82397106	
			Used on S/C 25 & above	82397106	82397106	
5-2	5-11	10	MINI MODULE ASSEMBLY (80 MB)			BZ5A5G/H
			Used on S/C 09-22	73034603	82397103	
			Used on S/C 23-24	73034618	82397103	
			Used on S/C 25 & above	82397103	82397103	
5-2	5-11	10	MINI MODULE ASSEMBLY (80 MB)			BZ5A9E/F
			Used on S/C 09-22	73034603	82397101	
			Used on S/C 23-24	73034618	82397101	
			Used on S/C 25 & above	82397101	82397101	
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			Moveable Heads except BZ9A1J/K/P/R Y/Z, BZ9A7G/S/W/Y, BZ9A9E/F, BZ911A/B Replacement re- quires LKBX card Replacement re- quires LKBX card Replacement re- quires LKBX card
			Used on S/C 09-16	73034604	82395200	
			Used on S/C 17-22	73034607	82395200	
			Used on S/C 23-24	73034613	82395200	
			Used on S/C 25 & above	82395200	82395200	

ENGINEERING--RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			BZ9A1J/K
			Used on S/C 18-22	73034607	82395210	Replacement re- quires LKBX card
			Used on S/C 23-24	73034613	82395210	Replacement re- quires LKBX card
			Used on S/C 25 & above	82395210	82395210	
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			BZ9A1P/R
			Used on S/C 09-16	73034604	82395215	Replacement requires LKBX card
			Used on S/C 17-22	73034607	82395215	Replacement requires LKBX card
			Used on S/C 23-24	73034613	82395215	Replacement requires LKBX card
			Used on S/C 25	82395200	82395200	
			Used on S/C 26 & above	82395215	82395215	
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			BZ9A1Y
			Used on S/C 22	73034607	82395213	Replacement re- quires LKBX card
			Used on S/C 23-24	73034613	82395213	Replacement re- quires LKBX card
			Used on S/C 25 & above	82395213	82395213	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			BZ9A1Z, BZ9A7G
			Used on S/C 22	73034607	82395208	Replacement re- quires LKBX card
			Used on S/C 23-24	73034613	82395208	Replacement re- quires LKBX card
			Used on S/C 25 & above	82395208	82395208	
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			BZ9A7S
			Used on S/C 29-31	82395200	82395216	
			Used on S/C 32 & above	82395216	82395216	
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			BZ9A9E/F
			Used on S/C 34 & Above	82395215	82395215	
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			Moveable + 48 Fixed Heads
			Used on S/C 09-16	73034605	82395201	except BZ9A1L/M Replacement re- quires LKBX card
			Used on S/C 17-22	73034608	82395201	Replacement re- quires LKBX card
			Used on S/C 23-24	73034615	82395201	Replacement re- quires LKBX card
			Used on S/C 25 & above	82395201	82395201	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig.	Page	Index				
No.	No.	No.				
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB) Used on S/C 29-31 Used on S/C 32 & above	82395200 82395218	82395218 82395218	BZ9A7W/Y
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB) Used on S/C 20-22 Used on S/C 23-24 Used on S/C 25 & above	73034608 73034615 82395211	82395211 82395211 82395211	BZ9A1L/M Replacement re- quires LKBX card Replacement re- quires LKBX card
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB) Used on S/C 09-16 Used on S/C 17-22 Used on S/C 23-24 Used on S/C 25 & above	73034606 73034609 73034614 82395202	82395202 82395202 82395202 82395202	Moveable + 96 Fixed Heads except BZ9A5E/F Replacement re- quires LKBX card Replacement re- quires LKBX card Replacement re- quires LKBX card
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB) Used on S/C 20-22 Used on S/C 23-24 Used on S/C 25 & above	73034609 73034614 82396212	82395212 82395212 82395212	BZ9A5E/F Replacement re- quires LKBX card Replacement re- quires LKBX card

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-2	5-11	18	BELT, Flat Drive Used on S/C 09 & above	92314125	92314125	60 Hz
5-2	5-11	18	BELT, Flat Drive Used on S/C 09 & above	92314126	92314126	50 Hz
5-3	5-13	5	FAN ASSEMBLY Used on S/C 09 & above	73019800	73019800	
5-3	5-13	16	AIR FILTER, Foam Used on S/C 09-11 Used on S/C 12 & above	94364904 73045700	73045700 73045700	
5-3	5-15	28	INDICATOR, LED Used on S/C 09-25 Used on S/C 09-25 Used on S/D 26 & above	94394101 94394114 94394114	94394101 94394114 94394114	All except BZ9A1J/K BZ9A1J/K
5-3	5-15	29	SWITCH P.B PANEL W/LED Indicator Used on S/C 09-25 Used on S/C 09-25 Used on S/C 26 & above	94394000 94394028 94394028	94394000 94394028 94394028	All except BZ9A1J/K BZ9A1J/K

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-4	5-17	3	INDICATOR, LED Used on S/C 17-25 Used on S/C 26 & above	94394101 94394114	94394101 94394114	
5-4	5-17	4	SWITCH, P.B. W/LED Indicator Used on S/C 17-25 Used on S/C 26 & above	94394000 94394028	94394000 94394028	
5-4	5-17	8	AIR FILTER, Foam Used on S/C 17 & above	73045702	73045702	
5-4	5-17	16	FAN ASSEMBLY Used on S/C 17 & above	73019800	73019800	
5-5	5-19	3	SWITCH, P.B. W/LED Indicator Used on S/C 17-25 Used on S/C 26 & above	94394000 94394028	94394000 94394028	
5-5	5-19	8	AIR FILTER, Foam Used on S/C 17 & above	73045701	73045701	
5-5	5-19	16	FAN ASSEMBLY Used on S/C 17 & above	73019800	73019800	

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83323150 AC

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-9	5-33		MOTOR & BRAKE ASSEMBLY Used on S/C 09-12 Used on S/C 13-16 Used on S/C 17-20 Used on S/C 21 & above	73035304 73035302 73035307 73035316	73035307 73035307 73035307 73035316	160 MB, 50 Hz Units
5-9	5-33	3	SPRING, Antistatic Used on S/C 09 & above	73010600	73010600	
5-9	5-33	14	KIT, Friction Brake Used on S/C 09 & above	73065700	73065700	
5-10	5-36.1		POWER SUPPLY ASSEMBLY Used on S/C 09-15 Used on S/C 16-19 Used on S/C 20-22 Used on S/C 23 & above Used on S/C 23 & above	70107400 70107401 70107403 70107405 70107407	70107405 70107405 70107405 70107405 70107407	Except BZ5A1L, BZ9A7L BZ5A1L,BZ9A7L
5-10	5-36.1	31	FUSE, 5 A, 250 V (F1) Used on S/C 09 & above	93418333	93418333	
5-10	5-37	38	DZYV COMPONENT ASSEMBLY Used on S/C 09 & above	54288903	54288903	
Table 5-1	5-40		TERMINATOR ASSEMBLY, AYDV Card Used on S/C 23 & above	75841300	75841300	BZ9A7C/D only

REVISION RECORD (Contd)

REVISION	DESCRIPTION
<p style="text-align: center;">H (3-18-80)</p>	<p>Manual revised to incorporate Series Code 17 changes, which includes ECOs 42238A, 49168, 50672, 50691A, 50721, 50734, 50743A, 50757, 50771, 50795, 50800, 50807, 50808A, 50809, 50814, 50824, 50835, 50838, 50843, 50848, 50853, 50860, 56604A, 58205.</p>
<p style="text-align: center;">J (5-15-80)</p>	<p>Manual revised to incorporate Series Code 18 changes, which includes ECO's 50855, 50870, 50904, 50900, 50911, 50778A, and also technical and editorial changes.</p>
<p style="text-align: center;">K (7-10-80)</p>	<p>Manual revised to incorporate Series Code 19 changes, which includes ECO's 50844, 50879, 50896A, 50920, 50916A, 50937, 50951A, 50935, 50977, 50976, and also technical and editorial changes.</p>
<p style="text-align: center;">L (9-12-80)</p>	<p>Manual revised to incorporate Series Code 20 changes: ECO's 50897B, 50928, 50967A, 50973A, technical changes, and editorial changes.</p>
<p style="text-align: center;">M (11-4-80)</p>	<p>Manual revised to incorporate Series Code 21 changes: ECO's 62003, 62004, 62014, 62029, 62028, 62043, 62044, 62071, technical changes, and editorial changes.</p>
<p style="text-align: center;">N (2-12-81)</p>	<p>Manual revised to incorporate Series Code 22 changes: ECO's 62072, 62084, 62112, 62070, FCO's 62072, 62112, 62070, technical changes, and editorial changes. Also incorporated Series Code 23 change: ECO/FCO 62127. This edition obsoletes all previous editions.</p>
<p style="text-align: center;">P (3-10-81)</p>	<p>Manual revised to incorporate Series Code 23 changes: ECO's 62073, 62142, 49195, 49196, FCO's 62142, 62212, 62213, technical and editorial changes.</p>
<p style="text-align: center;">R (5-1-81)</p>	<p>Manual revised to incorporate the following Series Code 24 changes: ECO's 62140, 62182, 62199, 62224, 62225, technical changes, and editorial changes.</p>

REVISION RECORD (Contd)

REVISION	DESCRIPTION
S (7-23-81)	Manual revised to incorporate the following Series Code 25 changes: ECO's 62226, 62253, 62266, 62309, technical changes, and editorial changes. Also incorporated FCO 02015.
T (9-23-81)	Manual revised to incorporate the following Series Code 26 changes: ECO's 02028, 02042, FCO's 02028, 02042, technical changes, and editorial changes. Also incorporated FCO 02099.
U (12-4-81)	Manual revised to incorporate the following Series Code 27 changes: ECO's 02085, 02044, technical changes, and editorial changes.
V (2-17-82)	Manual revised to incorporate Series Code 28 technical and editorial changes.

MANUAL TO EQUIPMENT LEVEL CORRELATION

This manual reflects the equipment configurations listed below.

EXPLANATION: Locate the equipment type and series code number, as shown on the equipment FCO log, in the list below. Immediately to the right of the series code number is an FCO number. If that number and all of the numbers underneath it match all of the numbers on the equipment FCO log, then this manual accurately reflects the equipment.

This correlation sheet also applies to the following related manuals:

Publication No. 83323160 Rev. K

Publication No. _____ Rev. _____

EQUIPMENT TYPE	SERIES CODE	WITH FCOS	COMMENTS
BZ5AX/BZ9AX	09	None	
	10	None	
	11	None	
	12	50476	Incorporates new front panel.
		50534	Read Recovery.
		50535	Write Fault Volt Marg.
	13	50505	Incorporates microprocessor servo.
	13	50603	Incorporates twisted pair wires.
		50591	Random seek errors.
	14	50632	Eliminates data errors on FNRN.
		50659	Corrects Servo Seek error.
	15	None	
	16	None	
17	None		
18	None		
19	50967A	50967A applies to BZ5A1V/W, BZ5AG/H only	

MANUAL TO EQUIPMENT LEVEL CORRELATION (Contd)

EQUIPMENT TYPE	SERIES CODE	WITH FCOs	COMMENTS
BZ5AX/BZ9AX	20	62072	FCO 62072 applies to BZ9A1J/K only
	21	62112	FCO 62112 applies to 80 MB units only
		62070	FCO 62070 applies to BZ5A1V/W, BZ5A5G/H only.
		62212	FCO 62212 applies to 80 MB units only.
		62213	FCO 62213 applies to 160 MB units only.
	22	62127 62142	FCO 62142 applies to 160 MB units only.
		02015	FCO 02015 applies to BZ5A1E/F/V/W/Z, BZ5A5G/H, BZ9A1C/W only.
	23	02099	FCO 02099 applies to BZ9A1J/K only.
	24	None	
	25	02028	FCO 02028 applies to BZ9A1J/K Series Codes 23/24 only.
		02042	FCO 02042 applies to BZ5A1B only.
	26	None	
	27	None	
28	None		

LIST OF EFFECTIVE PAGES

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New features, as well as changes, deletions, and additions to information in this manual are indicated by bars in the margins or by a dot near the page number if the entire page is affected. A bar by the page number indicates pagination rather than content has changed.

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Blank	-	2-32	N
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Blank	-	2-34	N
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Blank	-	2-36	N
S-2A Div	-	2-37	N
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Blank	-	3-1	E
2-63	N	3-2	E
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Blank	-	3-95	N
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3-53	S	Blank	-
3-54	S	3-111	U
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3-127	U	3-162	T
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3-129	S	3-164	T
3-130	S	3-165	N
3-131	S	Blank	-
3-132	S	3-167	R
3-133	S	3-168	N
Blank	-	3-169	R
3-135	U	3-170	N
3-136	U	3-171	R
3-137	S	3-172	N
3-138	S	3-173	R
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3-142	N	3-183	N
3-143	N	3-184	N
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3-145	N	3-186	N
3-146	N	3-187	N
3-147	N	3-188	N
3-148	N	3-189	N
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3-150	N	3-191	N
3-151	U	3-192	N
3-152	N	3-193	N
3-153	U	3-194	N
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4-4	N	5-29	V
4-5	N	Blank	-
4-6	N	5-31	V
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4-9	N	5-34	V
4-10	N	5-35	V
4-11	N	Blank	-
Blank	-	5-37	V
S-5 Div	-	5-38	V
Blank	-	5-39	V
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Blank	-	S-5B Div	-
S-5A Div	-	Blank	-
Blank	-	5-41	M
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5-7	U	5-46	U
Blank	-	5-47	V
5-9	V	5-48	V
5-10	V	5-49	V
5-11	V	5-50	V
5-12	V	5-51	V
5-13	T	5-52	V
Blank	-	5-53	V
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5-18	V	5-57	V
5-19	V	Blank	-
5-20	T	Cmt Sht	-
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5-23	M	Cover	-

PREFACE

This manual contains maintenance information for the CONTROL DATA® BZ5AX/BZ9AX (refer to the Configuration Chart in the front matter of this manual for a complete listing of equipment numbers) Mini Module Drives (MMD). It is prepared for customer engineers and other technical personnel directly involved with maintaining the MMD.

The information in this manual is presented as follows:

- Section 1 - Installation and Checkout. Contains site requirements, unpackaging and inspection, installation, and checkout.
- Section 2 - Maintenance. Contains general maintenance information, tests and adjustments, trouble analysis, repair and replacement.
- Section 3 - Diagrams. Contains logic diagrams.
- Section 4 - Wire Lists. Contains wire lists.
- Section 5 - Parts Data. Contains illustrated parts breakdown and spare parts list.

The following manuals apply to the MMD and are available from Control Data Corporation, Literature Distribution Services, 308 North Dale Street, St. Paul, MN 55103:

<u>Publication No.</u>	<u>Title</u>
83323150	BZ5AX/BZ9AX Hardware Maintenance Manual
83323160	BZ5AX/BZ9AX Hardware Reference Manual
83323970	Special Supplement (applies to BZ5A1J/K/R/S, BZ5A2C/D/G/H units only).
83323850	Special Supplement (applies to BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D/E/F units only).
83324470	Special Supplement (applies to BZ5A9L/M, BZ9A7A/B units only)
83324530	Special Supplement (applies to BZ5A9N/P units only)
83322440	CDC Microcircuits, Volume 1 (provides functional descriptions for integrated circuits)
83324440	CDC Microcircuits, Volume 2 (provides functional descriptions for integrated circuits)
83323790	A Guide for the Disk Drive Operator

ABBREVIATIONS (Contd)

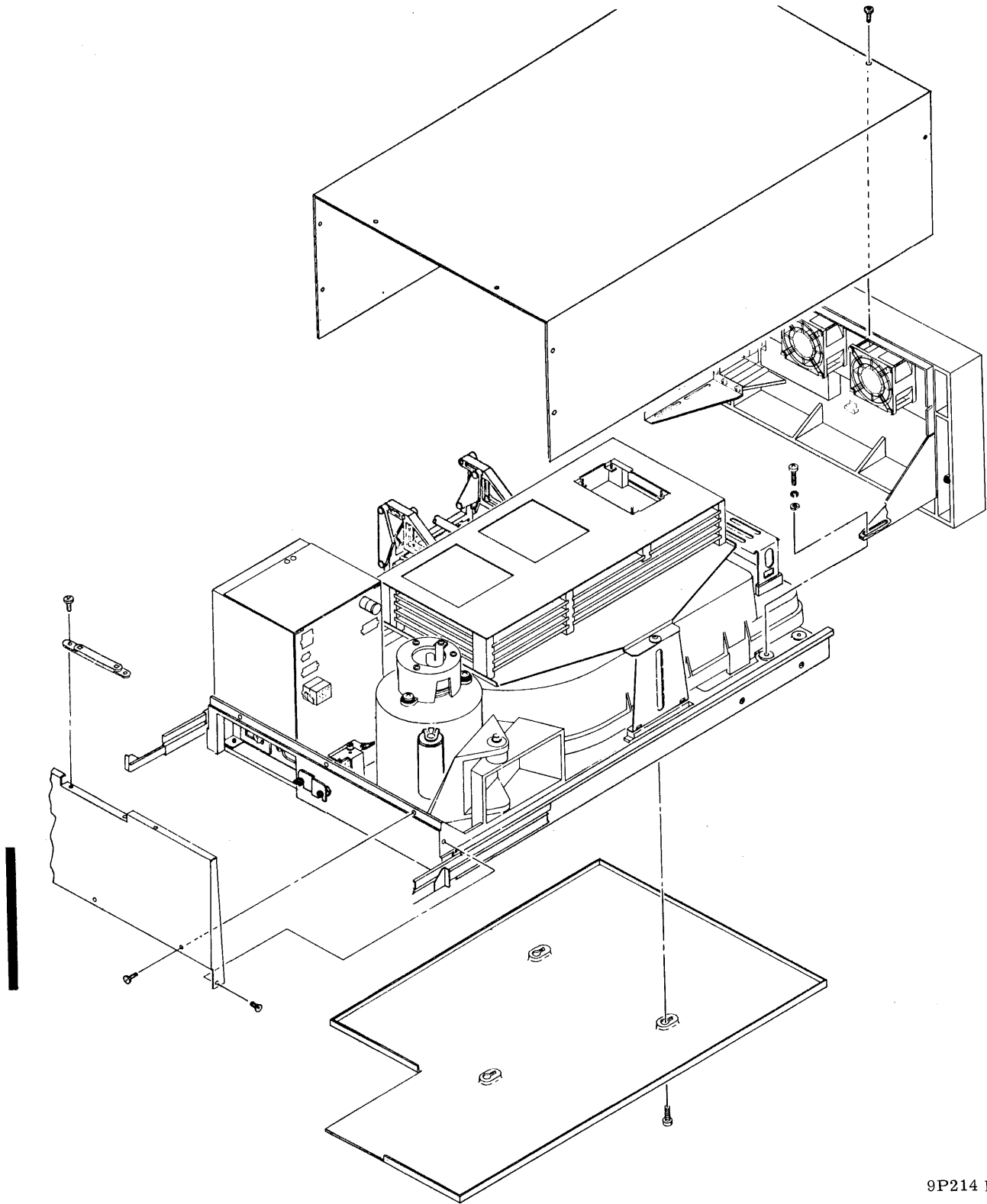
CONFIG	Configuration	EN	Enable
CONTD	Continued	EOT	End of Track
CRC	Cyclic Redundancy Check	EQUIP	Equipment
CRG	Carriage	EXT	External
CS	Chip Select	F	Fahrenheit, Fuse
CT	Center Tap	FCO	Field Change Order
CTR	Counter	FF	Flip Flop
CYL	Cylinder	FH	Fixed Head
D/A	Digital to Analog Converter	FIG	Figure
dc	Direct Current	FLT	Fault
DCCR	Decoder	FREQ	Frequency
DEM0D	Demodulator	ft	Foot
DIFF	Difference	FTU	Field Test Unit
DIG	Digital	FWD	Forward
DIS	Disable	FXD	Fixed
DLT	Decision Logic Table	GB	Guard Band
DRVR	Driver	GEN	Generator
ECL	Emitter Coupled Logic, Enabled Clock	GND	Ground
ECO	Engineering Change Order	GP	Group
EMER	Emergency	GRN	Green
EMG	Emergency	GRY	Grey
		HD	Head
		HDA	Head Disk Assembly

10. Position 90-degree tabs of each slide assembly catch firmly against each outer slide and tighten their adjustment nuts. This secures MMD on the slide assemblies.
11. At top of drive, take out allen head screws and remove top cover.
12. At bottom of drive, loosen screws securing bottom cover. Slide cover such that the screw heads can pass through cover slots. Remove bottom cover by dropping straight down as in figure 1-9.

NOTE

Two different methods of locking the drive motor are shown in figure 1-10. For newer drives (having a motor lock plate), perform step 13 and proceed to step 16. For older drives, proceed to step 14.

13. Unlock drive motor on newer units by turning motor shipping lock screw fully counterclockwise with a 5/32 in allen wrench. This raises motor lock plate until it contacts the self-locking nut.
14. Unlock drive motor on older units by loosening motor shipping lock screw (see figure 1-10), rotating motor so that motor mount plate clears screw, and tightening motor shipping lock screw until it and the tapped screw seat against base frame. Then allow motor to return to its original position.
15. Perform Drive Belt Replacement procedure given in the Repair and Replacement section.
16. Unlock actuator by rotating actuator shipping lock to unlocked position (see figure 1-11).
17. Position spindle lock and ground spring so that its contact is centered on spindle shaft. Tighten screws (see figure 1-12).



9P214 D

Figure 1-9. Cover Removal

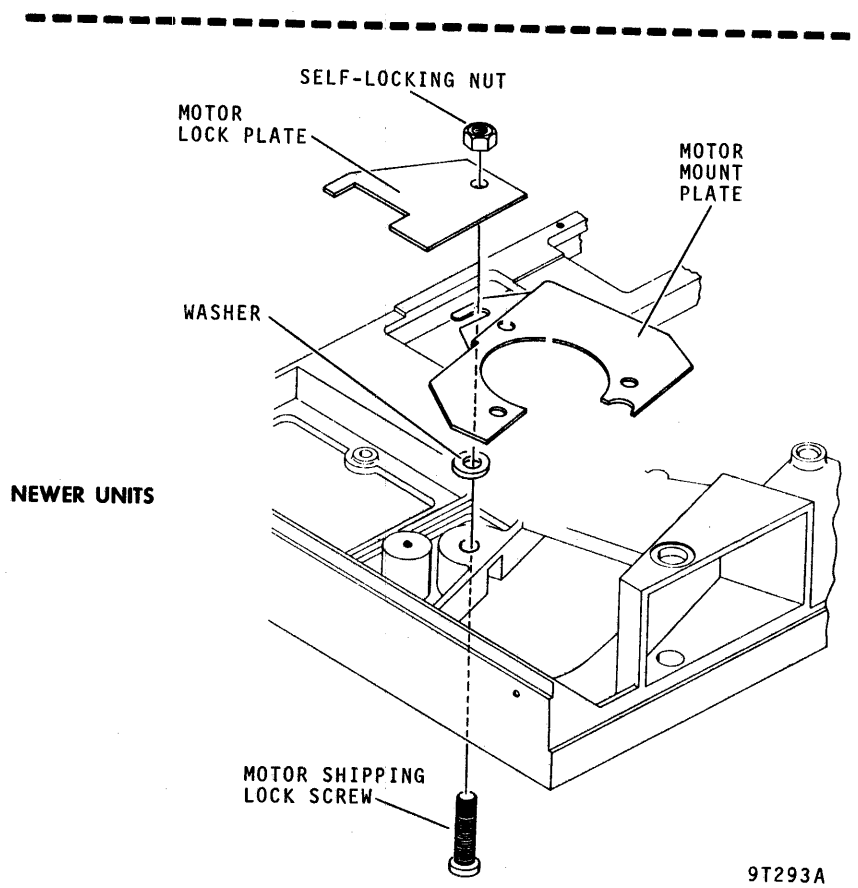
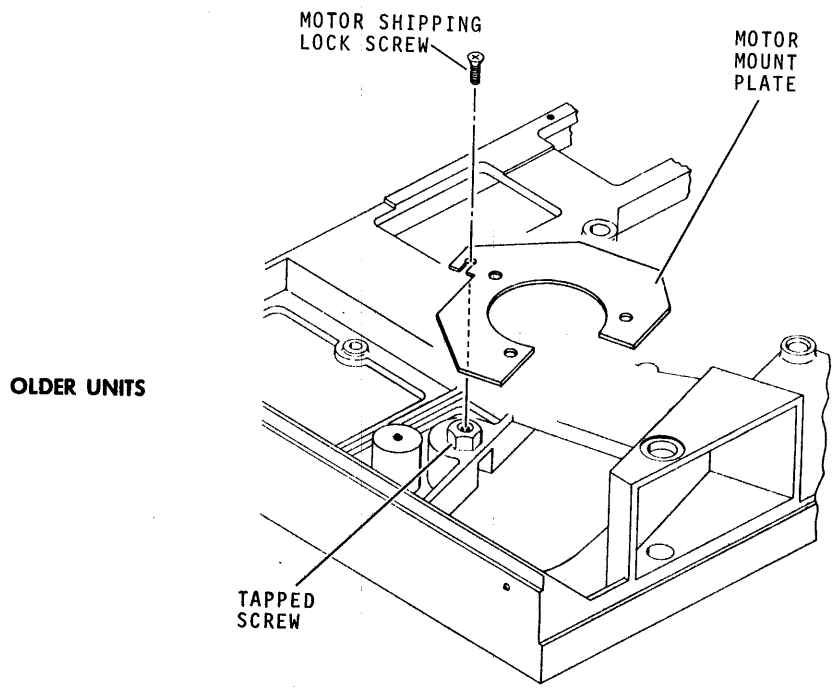


Figure 1-10. Drive Motor Lock Screw

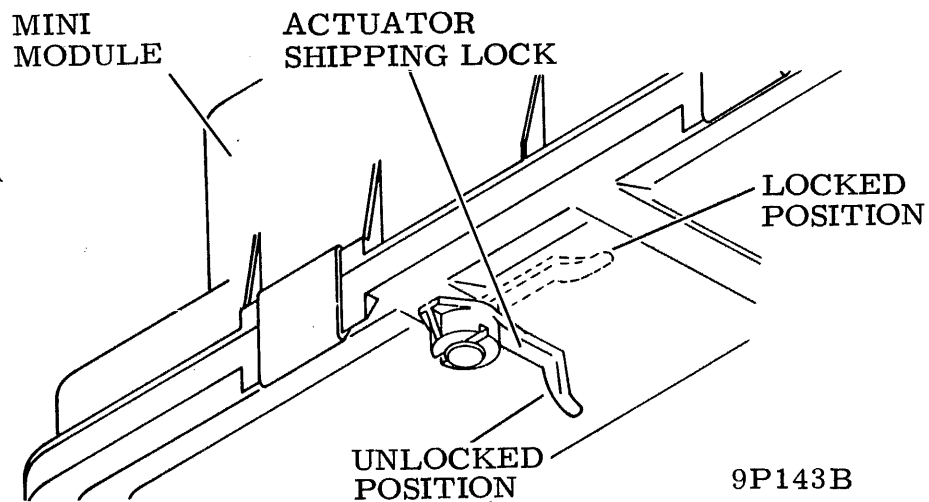


Figure 1-11. Actuator Shipping Lock

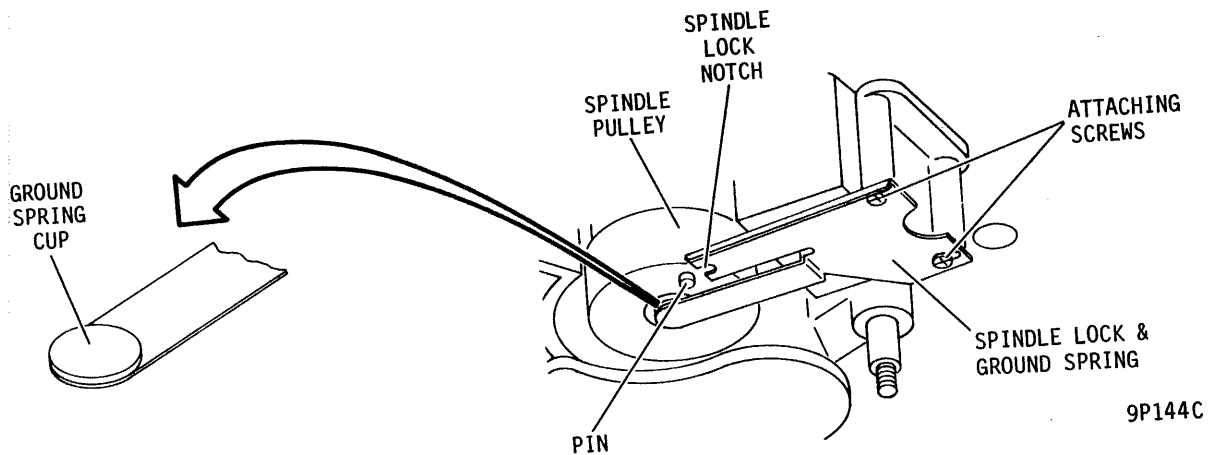
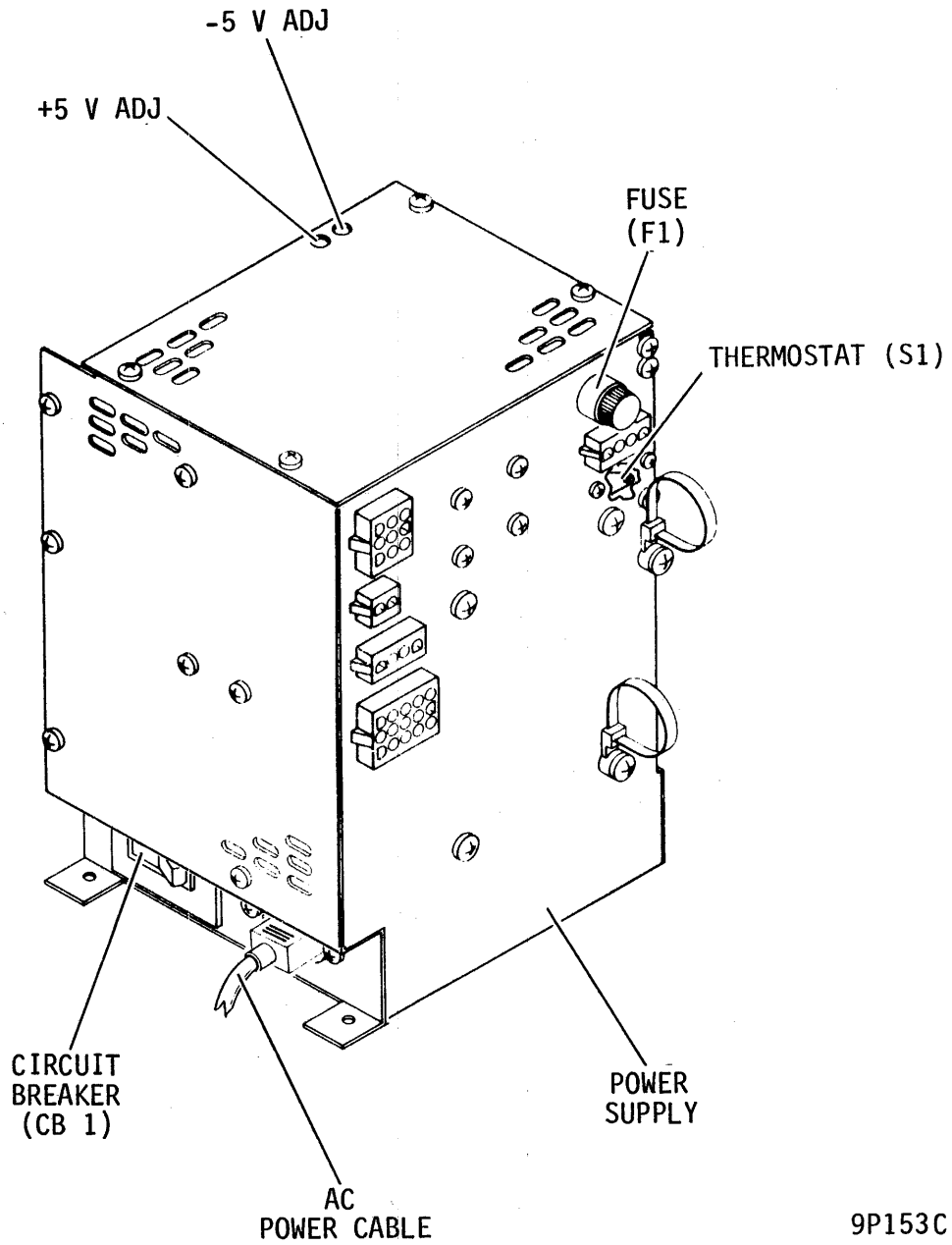


Figure 1-12. Spindle Lock and Ground Spring



9P153C

Figure 2-4. Power Supply

SERVO GAIN ADJUSTMENT

If the analog card assembly KBX or the mini module fails in the field, the following steps must be initiated to make certain that 8 volts peak to peak is available on the servo position signal as in figure 2-5.

1. Before installing replacement card in drive, using a voltohmmeter (VOM), adjust potentiometer SERVO GAIN ADJ (shown in figure 2-6) for the smallest resistance possible. Turn potentiometer counterclockwise.
2. Install KBX card assembly into drive.
3. Apply power to drive.
4. Place LOC/REM switch to LOC position enabling disks to spin and unit to load heads.
5. Using the FTU, command 33 track continuous seeks for 160 MB drives or 66 track continuous seeks for 80 MB drives.
6. Connect oscilloscope as shown in figure 2-5.
7. Observe the -Position signal and adjust potentiometer SERVO GAIN ADJ shown in figure 2-6 for a position signal amplitude of 8.0 ± 0.10 volts peak to peak.

OVERSHOOT ADJUSTMENT

This procedure contains instructions for minimizing access times by adjusting for optimum overshoot.

NOTE

Different criteria apply when adjusting different KBX Analog Servo cards. Throughout this procedure, refer to Sheet 1 of figure 2-7 for the LKBX card or to sheet 2 of figure 2-7 for other KBX cards.

1. Connect oscilloscope as shown in figure 2-7.
2. Apply power to drive.
3. Command random seeks.
4. Observe +Position signal at TP17 on B01/C01 card assembly as shown in figure 2-7. Scope display shows traces for in and out direction seeks superimposed.

REPLACEMENT

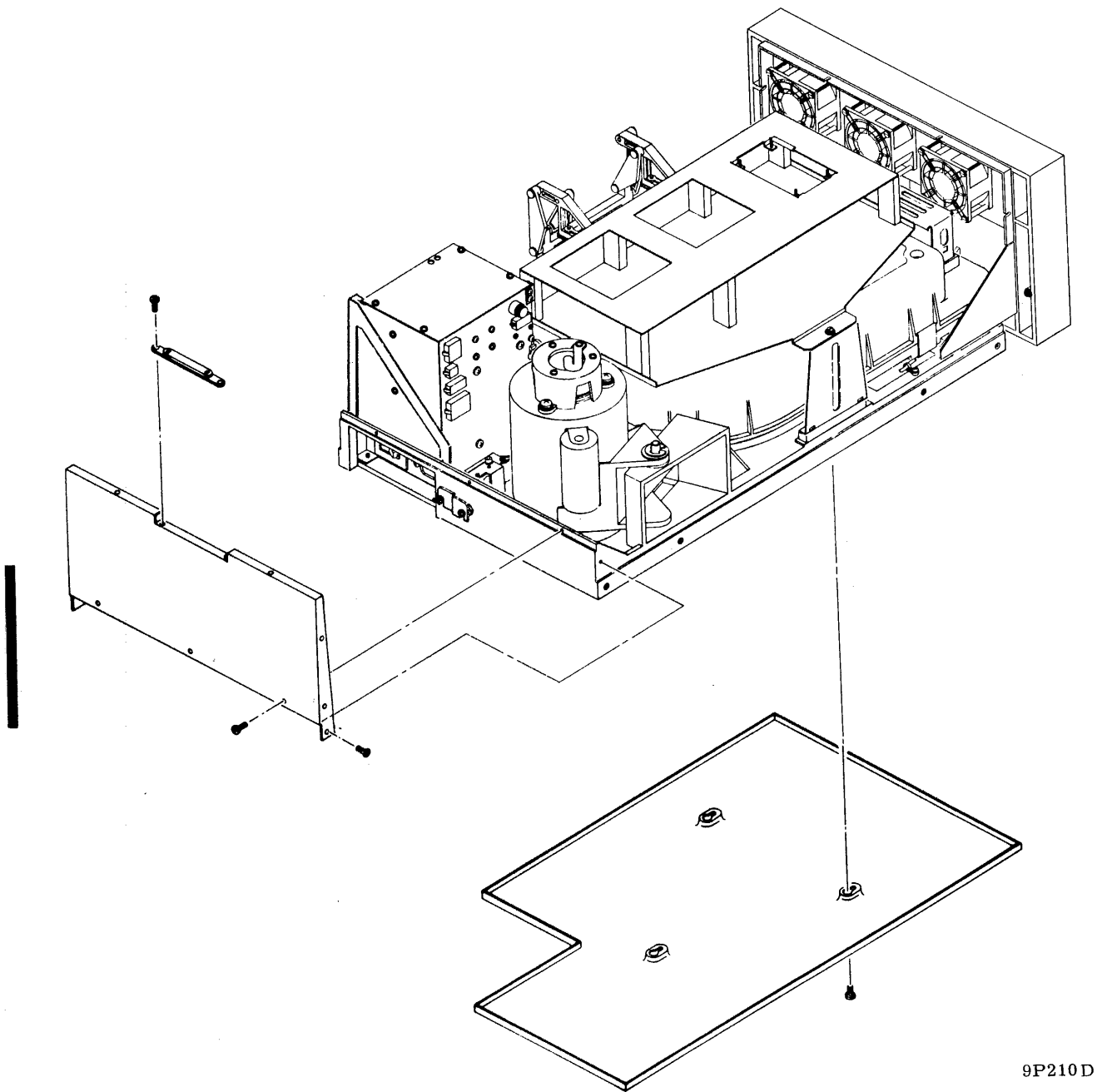
1. Place top cover over drive and align holes in cover with screw holes.
2. Replace screws to hold top cover to base frame.
3. Restore power to drive.
4. Return drive to operating position in mounting rack.
5. Return drive to online operation.

BOTTOM COVER REMOVAL AND REPLACEMENT

This procedure applies either to replacement of a defective bottom cover or to temporary removal of the bottom cover to access other components in the drive.

REMOVAL

1. Extend drive fully to maintenance position.
2. Place circuit breaker CBI in OFF position and disconnect power cord at drive or ac source.
3. Loosen screws securing bottom cover to base frame as shown in figure 2-27.
4. Slide cover toward front of drive until screws align with enlarged holes in cover. Lower cover until cover clears base of unit.
5. Remove bottom cover.



9P210D

Figure 2-27. Bottom Cover

DRIVE BELT REMOVAL AND REPLACEMENT

This procedure applies either to replacement of the drive belt or to temporary removal of the drive belt to allow removal of other components. Two people are needed to install a drive belt, one to position the drive motor and the other to align the belt on the pulleys.

REMOVAL

1. Perform Top Cover Removal procedure.
2. Perform Bottom Cover Removal procedure.

CAUTION

Do not allow spindle to rotate during drive belt removal. Rotating the spindle in the wrong direction could damage the mini module.

3. Push drive motor forward until drive belt falls off as shown in figure 2-30.

REPLACEMENT

NOTE

The following step may require two people.

1. Push drive motor forward until drive belt slips over pulleys on spindle and drive motor.

CAUTION

In the following step, failure to rotate the spindle in the specified direction could damage the mini module.

2. Rotate spindle in direction shown in figure 2-30 until drive belt is centered on pulleys.
3. Perform Bottom Cover Replacement procedure.
4. Perform Top Cover Replacement procedure.

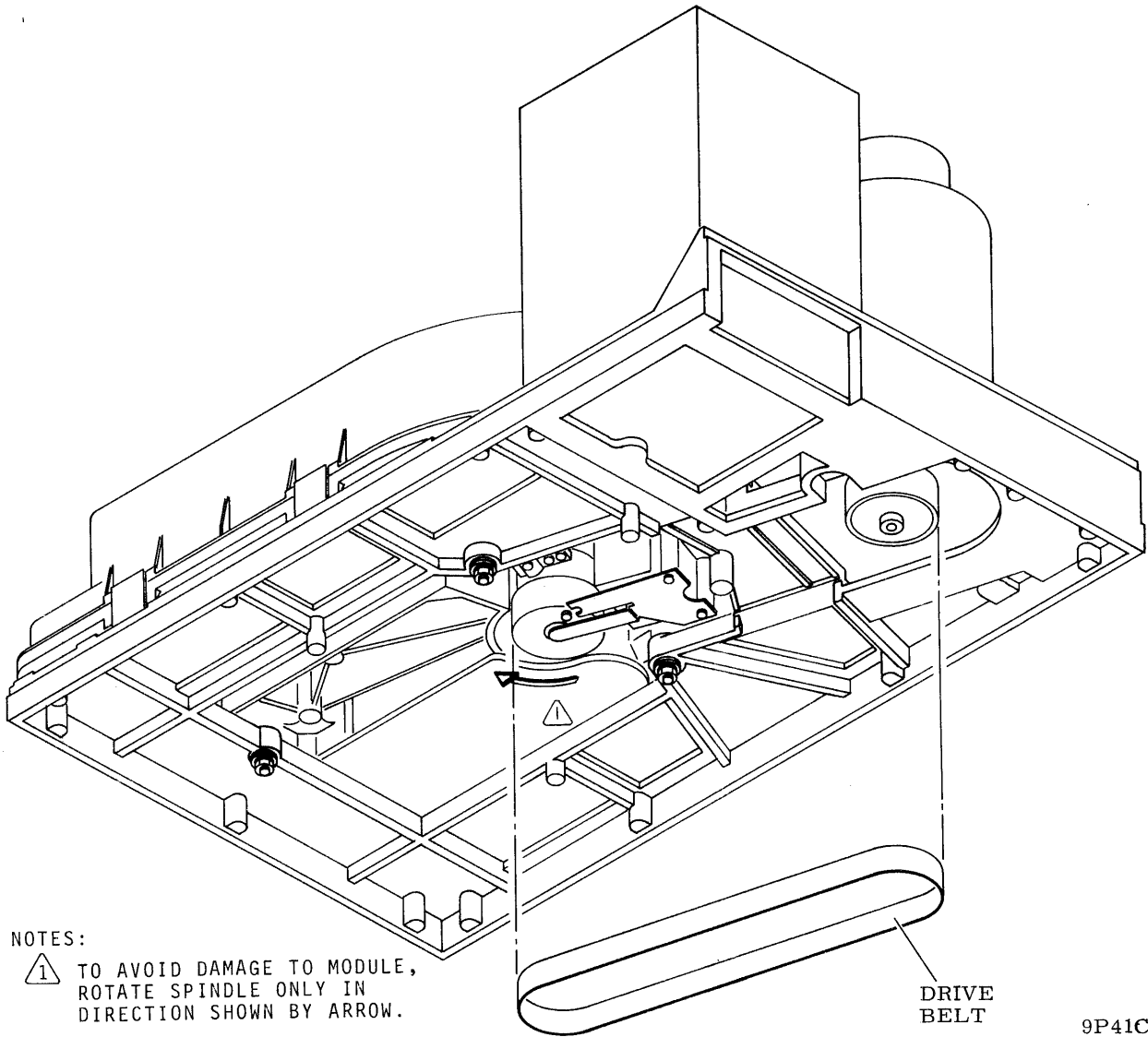


Figure 2-30. Drive Belt Removal and Replacement

REVISION STATUS OF SHEETS																				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
A	A	A	A																	
B	A	B	A																	
C	C	C	C																	
D	C	C	D																	
E	C	E	D																	
F	C	F	D																	
G	C	F	G																	
H	C	H	G																	
J	J	H	G																	

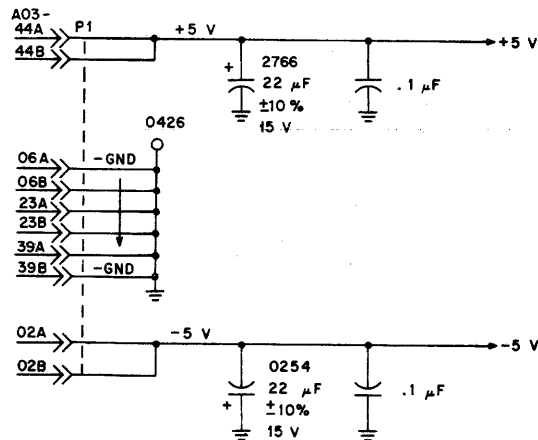
REVISIONS					
REV.	ECO.	DESCRIPTION	DRFT.	DATE	CHK'D
A	PE23000	RELEASED			
B	PE50705	CORRECTIONS	TH	12-26-79	
C	PE50745A	REPLACE BPEX WITH EFEX	CB	3-2-80	
D	PE62290	CHANGE RESISTOR VALUE	MF	6-1-81	
E	PE62124	CHANGE DIODE	MF	6-1-81	
F	PE62124C	CHANGE CAPACITOR	MF	8-17-81	
G	DJ02108	CHANGE RESISTOR AND CAPACITOR	DLM	9/30/81	
H	PE62124E	CHANGE INDUCTOR	MF	12-31-81	
J	DJ02251	CHANGE TRANSISTOR	MJ	3-2-82	

UNUSED LOGIC ELEMENTS

ELEMENT	LOCATION	OUTPUT PIN(S)
203LS	2943	10,12
148LS	2443	10
10125	1942	13
195L	2909	6,7
10124	1353	1,2,3,4
10102	0320	14
10102	0853	3

NOTES:

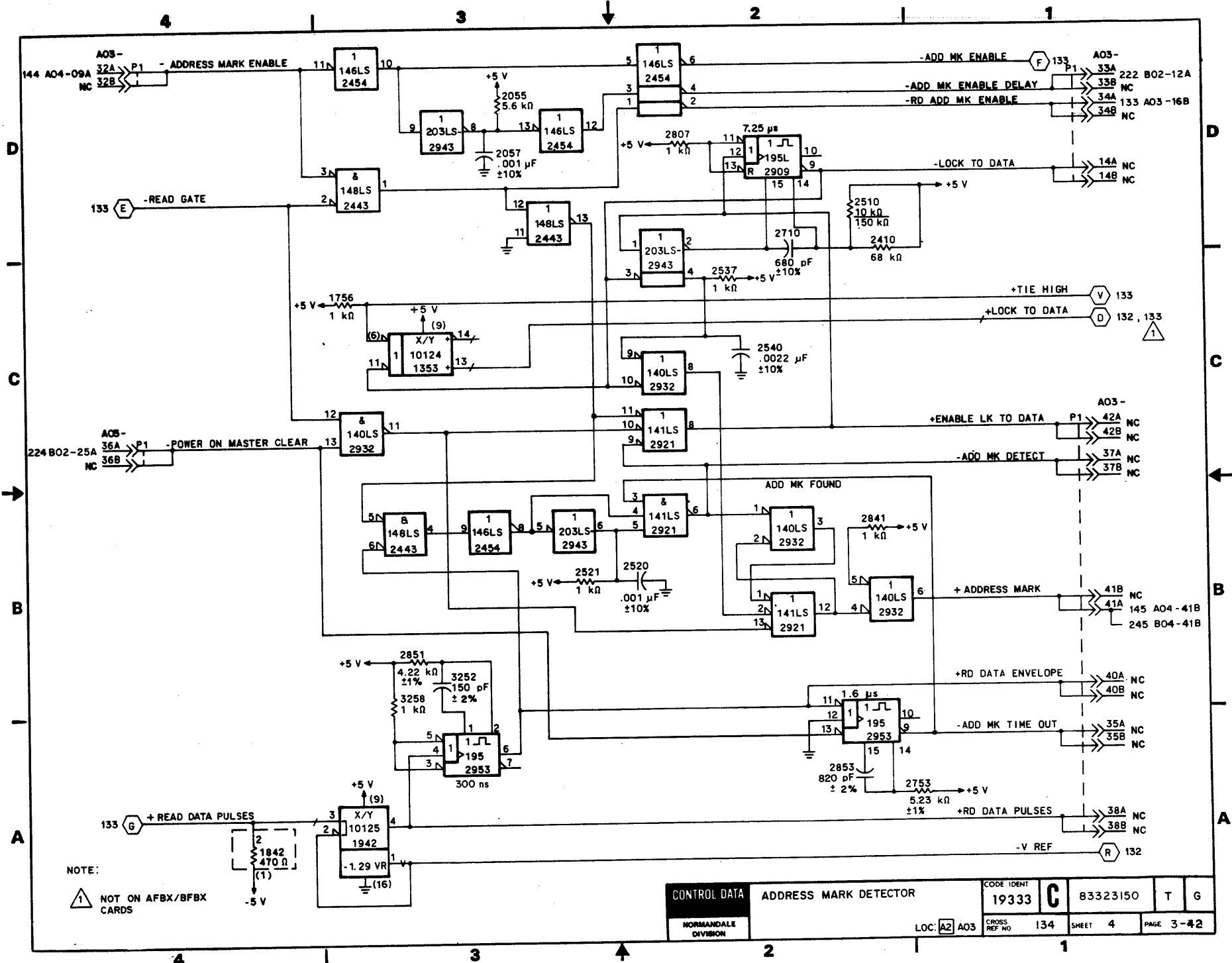
- UNUSED TTL LOGIC ELEMENT INPUT PINS ARE GROUNDED.
- UNLESS OTHERWISE SPECIFIED: ALL ECL IC'S IN THIS DIAGRAM HAVE -5 V ON PIN 8 AND GND ON PINS 1 AND 16.



.1 µF FILTER CAPS

+ 5 V	- 5 V
1854	0635
0362	1137
2843	1736
2522	1429
2310	1344
2434	1655

DRAWN	<i>M. Anderson</i>	4-9-78	CONTROL DATA	READ PLO	CODE IDENT	19333	C	83323150	V	J
CHECKED				DIAGRAMS A/B/EFEX	CROSS REF NO	131	SHEET	OF 4	PAGE	3-39
ENGINEER			NORMANDEALE DIVISION	TYPE: A/B/EFEX	LOC: A2	A03				
APPROVED										



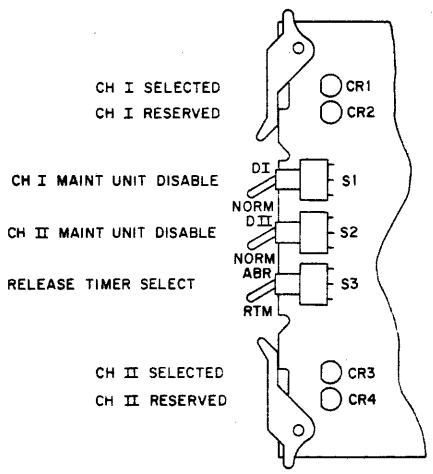
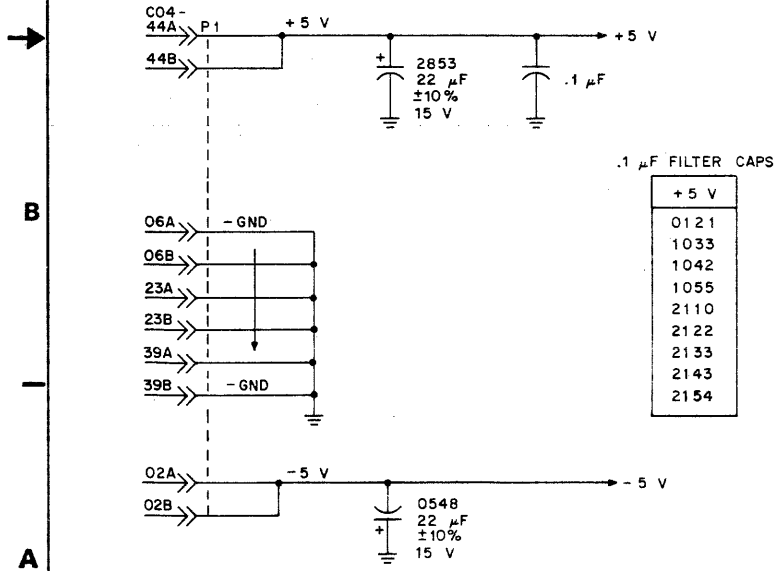
NOTE:
 ⚠ NOT ON AFBX/BFBX CARDS

CONTROL DATA NORMANDELE DIVISION	ADDRESS MARK DETECTOR		CODE IDENT 19333	C	83323150	T	G
	LOC: A2 A03	CROSS REF NO 134	SHEET 4		PAGE 3-42		

REVISION STATUS OF SHEETS																				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
A	A	A	A																	

REVISIONS					
REV.	ECO.	DESCRIPTION	DRFT.	DATE	CHK'D
A	PE23000	RELEASED			

UNUSED LOGIC ELEMENTS		
ELEMENT	LOCATION	OUTPUT PIN(S)
193	1842	5,12
146LS	2321	6,10



NOTES:

1. UNUSED LOGIC ELEMENT INPUT PINS ARE GROUNDED EXCEPT PINS 9 AND 10 OF 193 ARE OPEN.

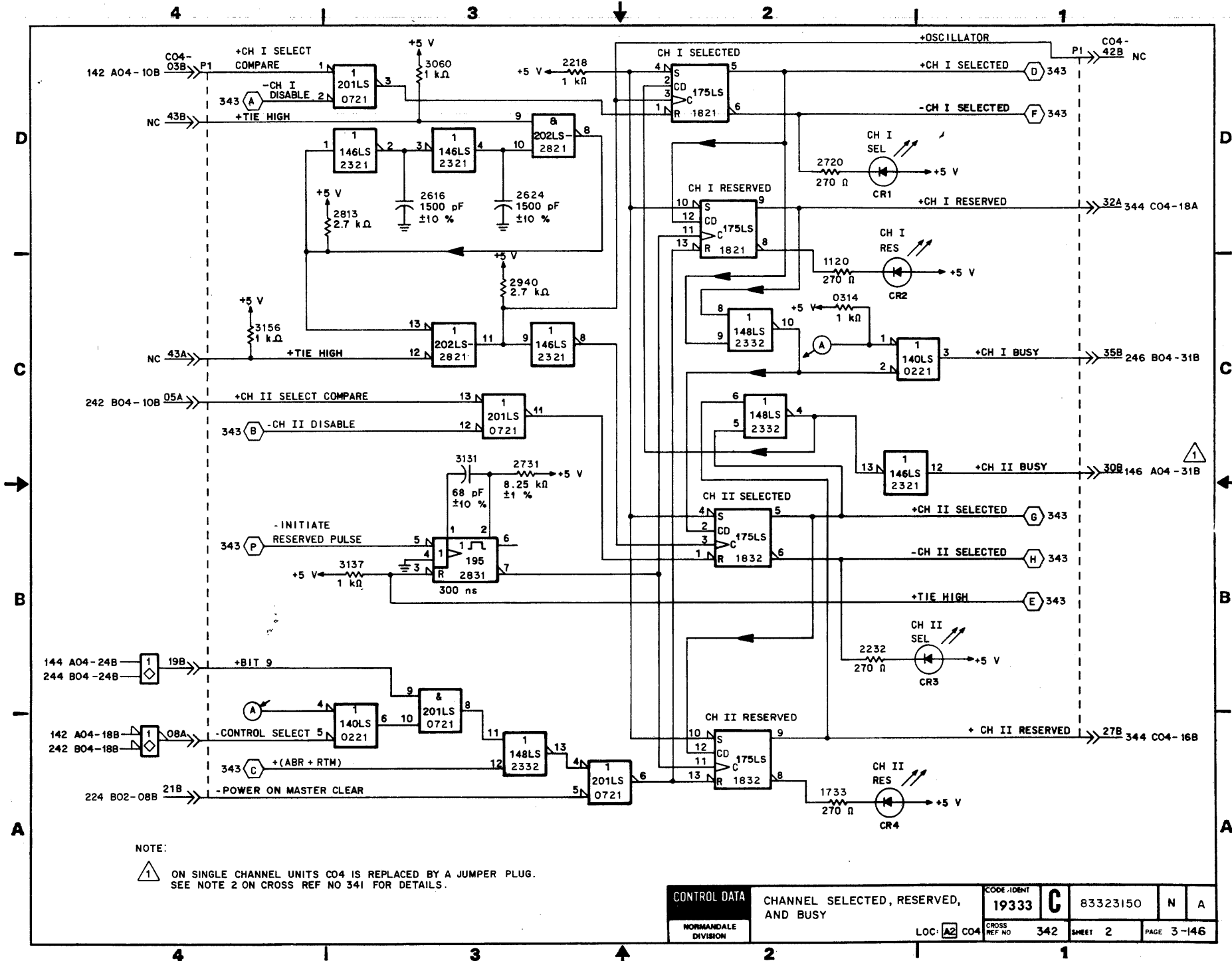
2. ON SINGLE CHANNEL UNITS CO4 IS REPLACED BY A JUMPER PLUG ON THE W/W SIDE OF THE BACKPANEL. THESE LINES ARE JUMPERED TOGETHER:

344 CO4 - 15B	→	344 CO4 - 20B
344 CO4 - 17A	→	344 CO4 - 18B
GND CO4 - 23B	→	342 CO4 - 30B
343 CO4 - 30A	→	343 CO4 - 31B
343 CO4 - 33A	→	343 CO4 - 33B
343 CO4 - 35A	→	343 CO4 - 36A

SEE CROSS REF NO INDICATED FOR SIGNAL ORIGINS AND DESTINATIONS.

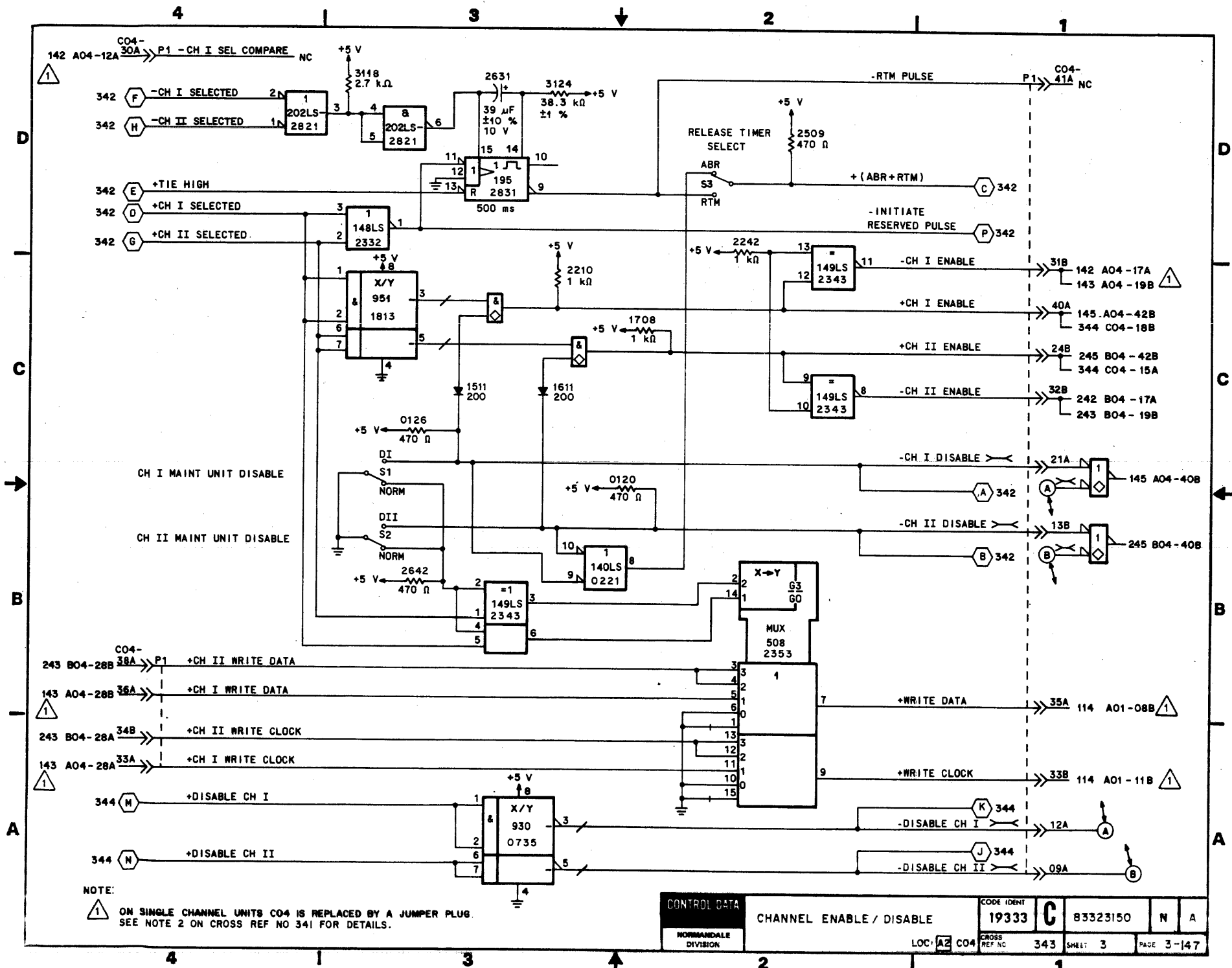
APPLICABLE ONLY TO DUAL CHANNEL UNITS 2

DRAWN	G. ROBINSON 4-4-79	CONTROL DATA	DUAL CHANNEL STEERING DIAGRAMS	CODE IDENT	19333 C	83323150	N	A
CHECKED				CROSS REF NO	341	SHEET 1 OF 4	PAGE 3-145	
ENGINEER		NORMAN DALE DIVISION	TYPE: AFBX	LOC: A2 CO4				
APPROVED								



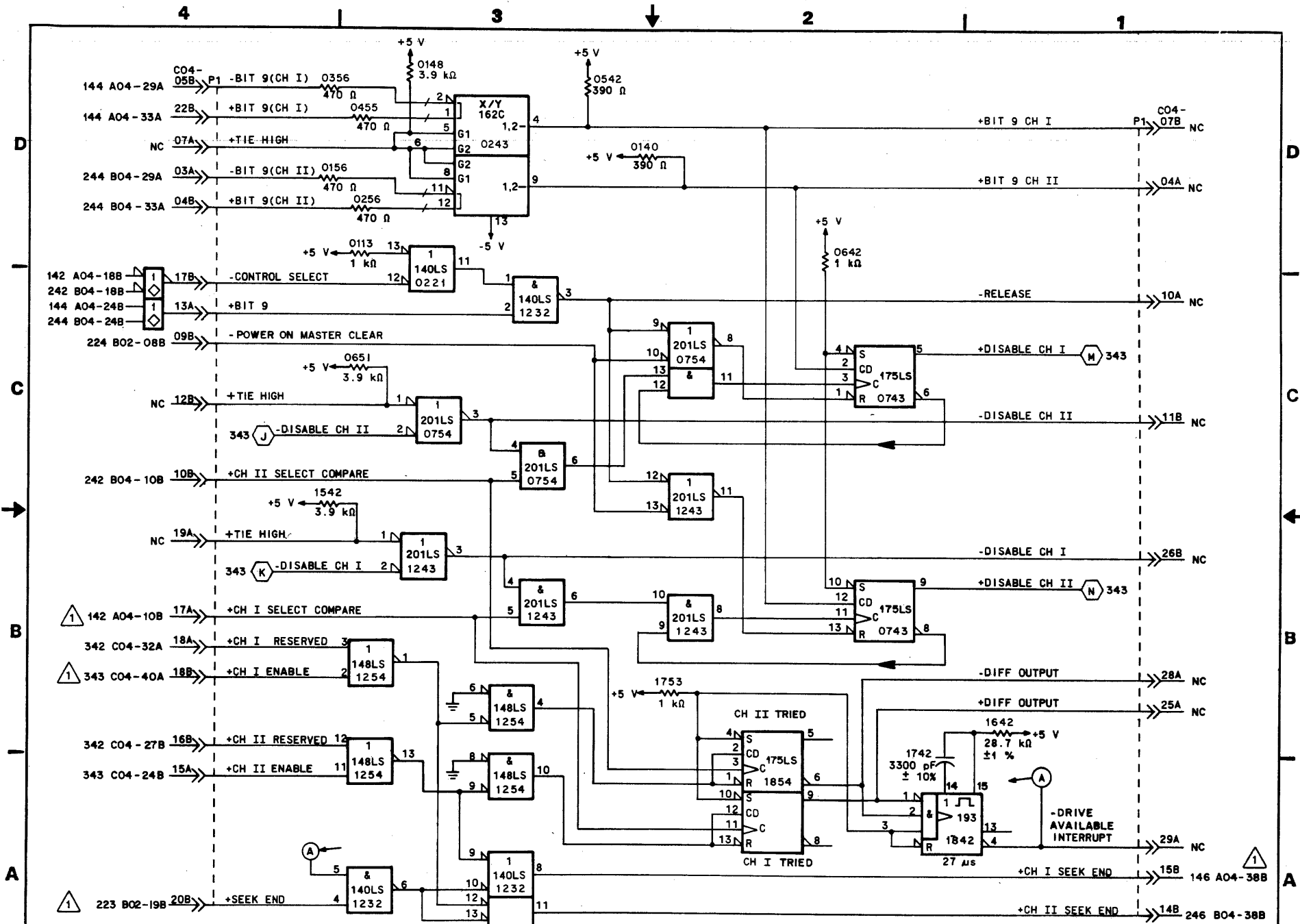
NOTE:
 1 ON SINGLE CHANNEL UNITS CO4 IS REPLACED BY A JUMPER PLUG.
 SEE NOTE 2 ON CROSS REF NO 341 FOR DETAILS.

CONTROL DATA NORMANDELE DIVISION	CHANNEL SELECTED, RESERVED, AND BUSY		CODE IDENT 19333 C	83323150	N	A
	LOC: A2 CO4	CROSS REF NO 342	SHEET 2	PAGE 3-146		



NOTE:
 ⚠ ON SINGLE CHANNEL UNITS CO4 IS REPLACED BY A JUMPER PLUG.
 SEE NOTE 2 ON CROSS REF NO 341 FOR DETAILS.

CONTROL DATA NONNORMANDE DIVISION	CHANNEL ENABLE / DISABLE		CODE IDENT 19333	C	83323150	N	A
	LOC: A2 CO4	CROSS REF NC	343	SHEET 3	PAGE 3-147		



NOTE:
 1 ON SINGLE CHANNEL UNITS CO4 IS REPLACED BY A JUMPER PLUG.
 SEE NOTE 2 ON CROSS REF NO 341 FOR DETAILS.

CONTROL DATA NORMANDALE DIVISION	DISABLE, INTERRUPT, AND SEEK END		CODE IDENT 19333	C	83323150	N	A
	LOC: A2 CO4	CROSS REF N:	344	SHEET 4	PAGE 3-148		

REVISION STATUS OF SHEETS

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B	B	A	A																	
C	B	C	A																	

REVISIONS

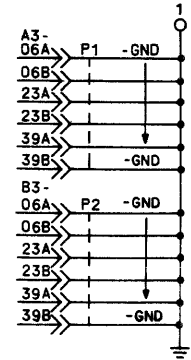
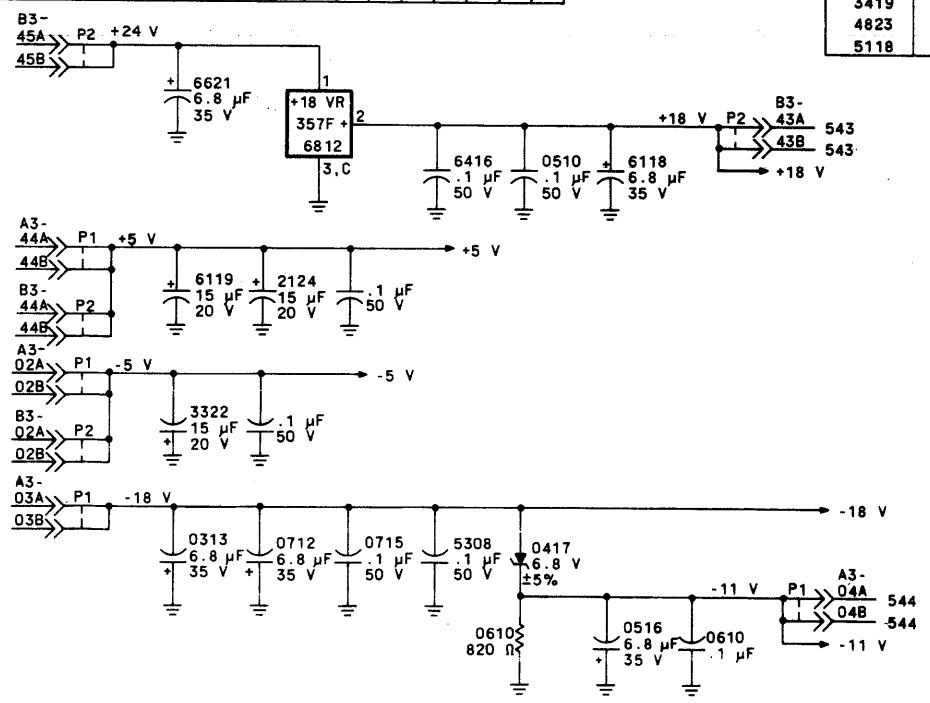
REV	ECO.	DESCRIPTION	DRFT.	DATE	CHK'D
A	PE23000	RELEASED			
B	PE49188	CHG RES A T 2418	MF	11-17-80	
C	PE62277	DELETE CAPACITOR	MF	6-1-81	

UNUSED DIODE ARRAY

LOCATION	PINS
1718	5, 6, 7, 8, 9, 10, 11, 12

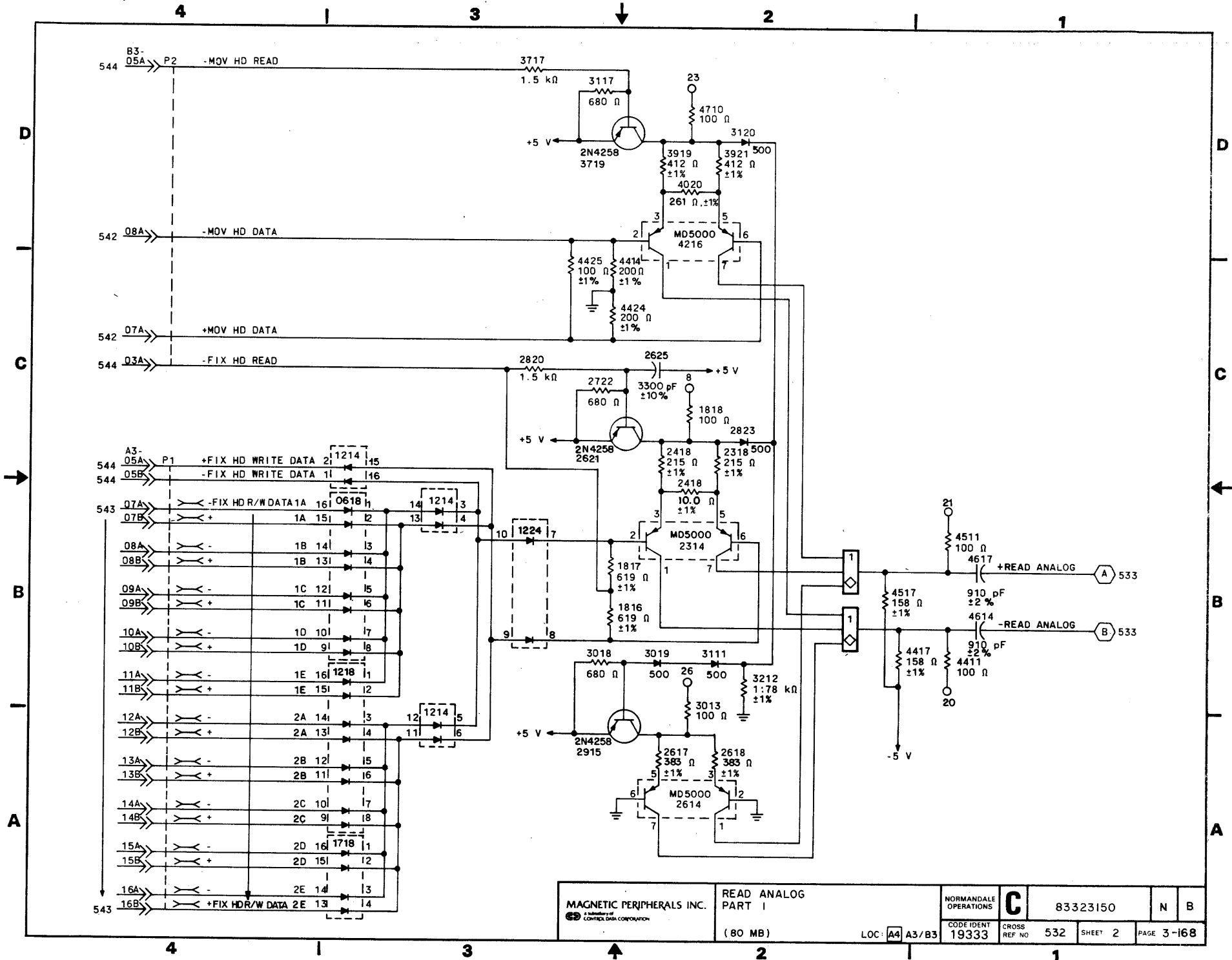
.1 μF FILTER CAPS

+5 V	-5 V
.2023	4810
3419	4910
4823	6906
5118	

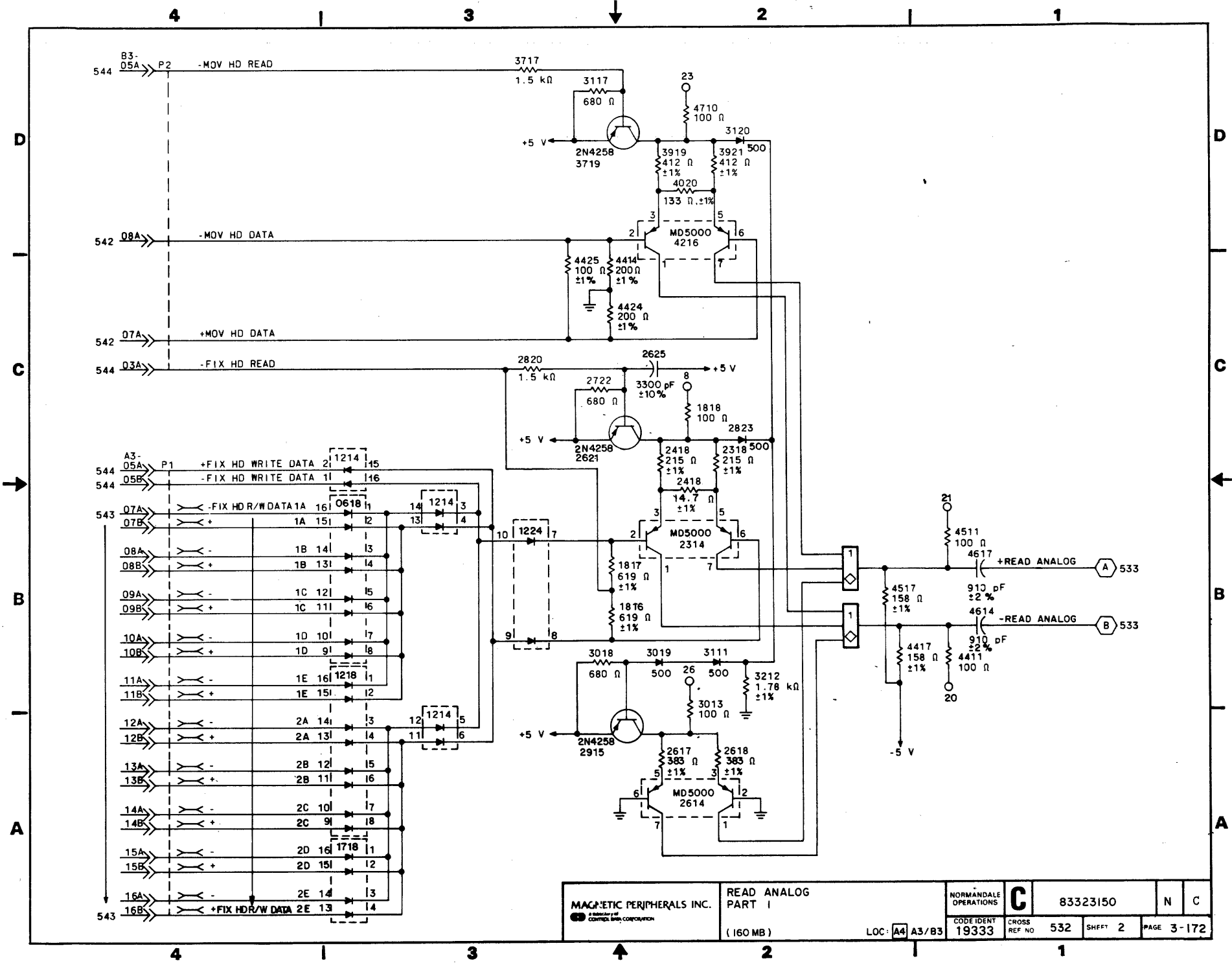


APPLICABLE ONLY TO 80 MB UNITS

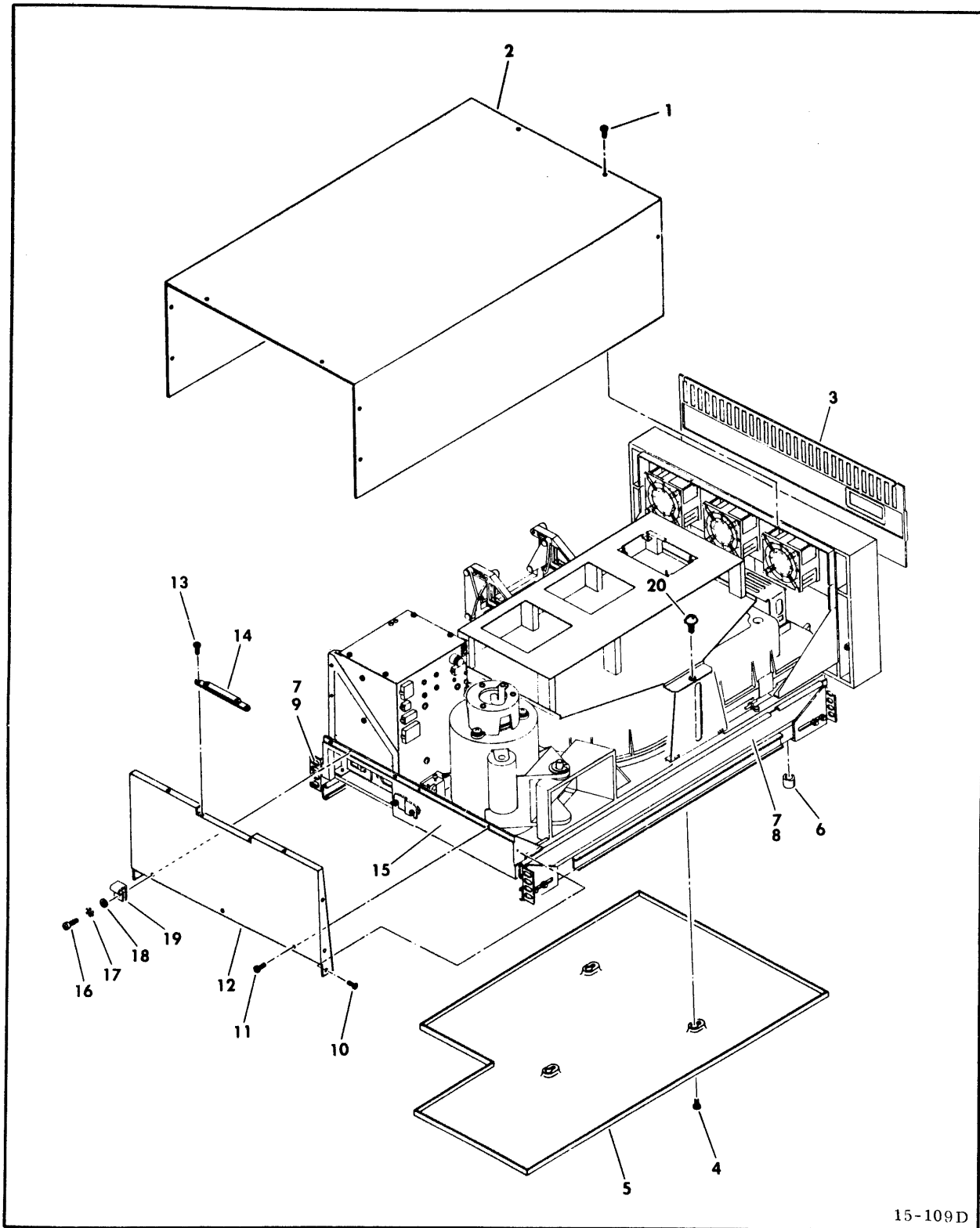
DRAWN: <i>[Signature]</i> CHECKED: _____ ENGINEER: _____ APPROVED: _____	MAGNETIC PERIPHERALS INC. A Division of International Business Corporation	READ ANALOG DIAGRAMS TYPE: ENRN	NORMANCALE OPERATIONS C	83323150	R C
CODE DENT: 19333 JASS REF NO: 531	SHEET: 1 of 4 PAGE: 3-167	LOC: A4/A3/B3	REF 75121618		



MAGNETIC PERIPHERALS INC. <small>A DIVISION OF CONTROL DATA CORPORATION</small>	READ ANALOG PART I (80 MB)	NORMANDALE OPERATIONS C	83323150	N	B
	LOC: A4 A3/B3	CODE IDENT 19333	CROSS REF NO 532	SHEET 2	PAGE 3-168



MAGNETIC PERIPHERALS INC. <small>a subsidiary of</small> <small>COMPTON CORP.</small>	READ ANALOG PART 1 (160 MB)	NORMANDE OPERATIONS C	83323150	N	C
	LOC: A4 A3/B3	CODE IDENT 19333	CROSS REF NO	532	SHEET 2



15-109D

Figure 5-1. Top Level Assembly

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-1	730367XX	TOP LEVEL ASSEMBLY	
5-1	730368XX	TOP LEVEL ASSEMBLY	
5-1	823998XX	TOP LEVEL ASSEMBLY	
1	92727202	SCREW, Sch Btn, 6-32 x 1/2	
2	73011300	COVER, Top	
3		PANEL, Color	See Configuration Chart in front of manual for part number
4	93660079	SCREW, Phillips, 8-32 x 1/2	
5	73022700	COVER, Bottom	
6	95796512	CLOSURE, Vinyl	
7	10125724	SCREW, Flat Hd, 8-32 x 3/8	All except BZ9A1J/K/L/M, BZ9A5E/F
7	10127122	SCREW, PHH PNH Mach, 8-32 x 3/8	BZ9A1J/K/L/M, BZ9A5E/F only
8	94391905	SLIDE, Quick Disconnect	All except BZ9A1J/K/L/M, BZ9A5E/F
8	73043500	PLATE, Retainer	BZ9A1J/K/L/M, BZ9A5E/F only
9	94391904	SLIDE, Quick Disconnect	All except BZ9A1J/K/L/M, BZ9A5E/F
9	73043500	PLATE, Retainer	BZ9A1J/K/L/M, BZ9A5E/F only
10	10125722	SCREW, Flat Hd, 8-32 x 1/4	
11	93660073	SCREW, PHH PNH Mach, 8-32 x 1/4	
12	73019500	COVER, Rear	
13	10127112	SCREW, PHH PNH Mach, 6-32 x 5/16	
14	94386407	MOUNT, Cable	
15		DRIVE FINAL ASSEMBLY (See Figure 5-2)	
16	93660074	SCREW, PHH PNH Mach, 8-32 x 5/16	
17	10126402	LOCKWASHER, #8	
18	10125606	WASHER, #8	
19	92602004	CABLE CLAMP	
20	93660107	SCREW, PHH PNH W/ Lockwasher	S/C 21 & Abv only

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-1		TOP LEVEL ASSEMBLY (Contd)	
	92006812	PLATE, Equip Ident	
	94397000	EMBLEM, Product Ident	BZ5A1B/C/D/H/L, BZ5A2A/B/J, BZ5A3A/B, BZ5A4A/B, BZ5A5A/B/D/F/K/L, BZ5A6A/B, BZ5A9E/F/N/P, BZ9A1A/B/W/Y/Z, BZ9A2A/B, BZ9A3A/B BZ9A4A/B, BZ9A5A/B, BZ9A6A/B/E/F, BZ9A7L only
	75778701	POWER CORD (60 Hz)	All except BZ5A1L,BZ9A7L
	82392310	POWER CORD (60 Hz)	BZ5A1L,BZ9A7L
	75778710	POWER CORD (50 Hz)	
	92034702	PANEL, Front, Matched Set	BZ5A5K only
	92034700	PANEL, Front, Matched Set	BZ5A5L only
	77563300	BALLAST	BZ5A5K/L only
	76846300	HARDWARE KIT*	All except BZ5A5D/F, BZ9A7C/D
	76846305	HARDWARE KIT*	BZ9A7C/D
	92555238	HARDWARE KIT*	BZ5A5D/F

* Refer to table 5-1 for listing of kit piece parts.

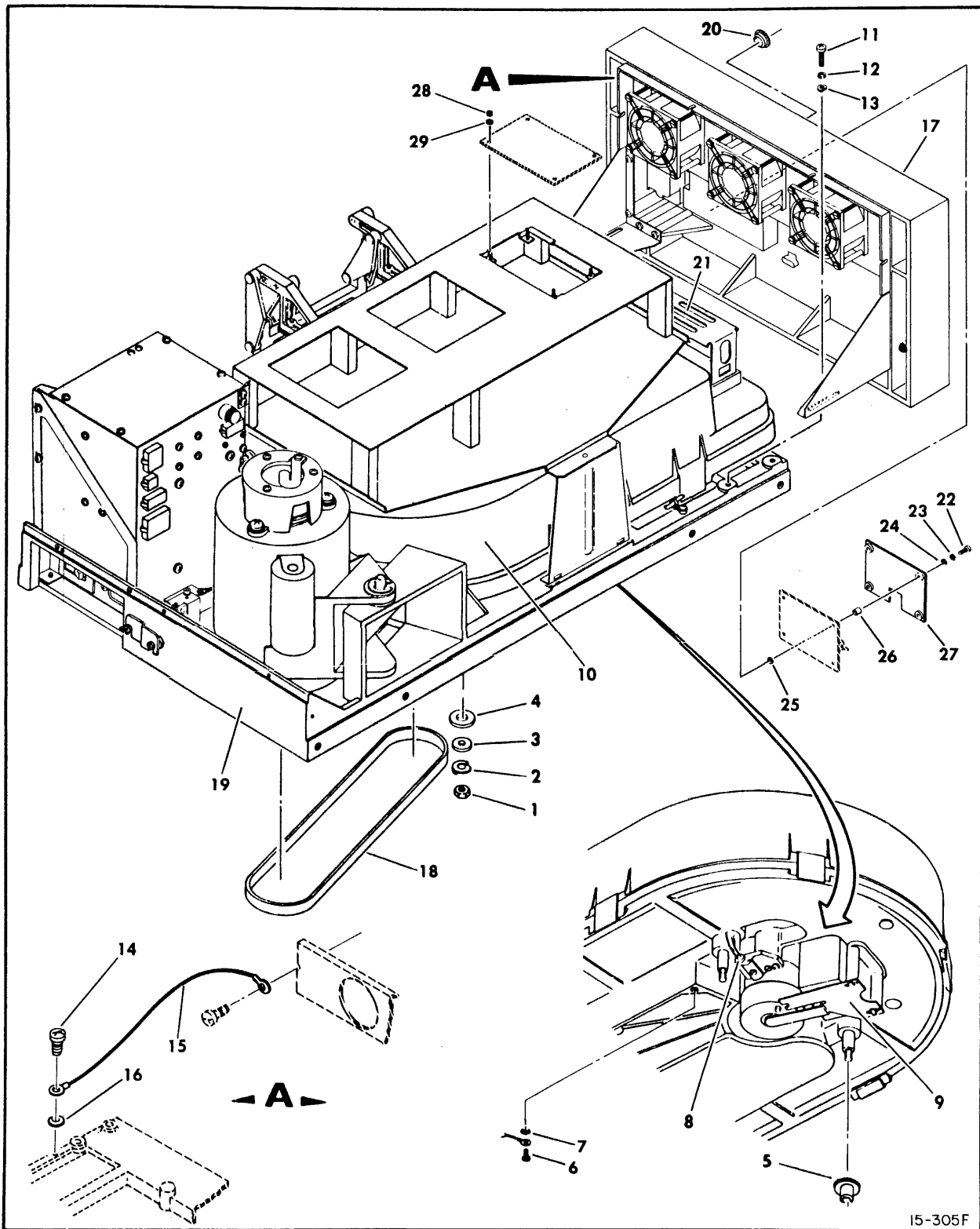
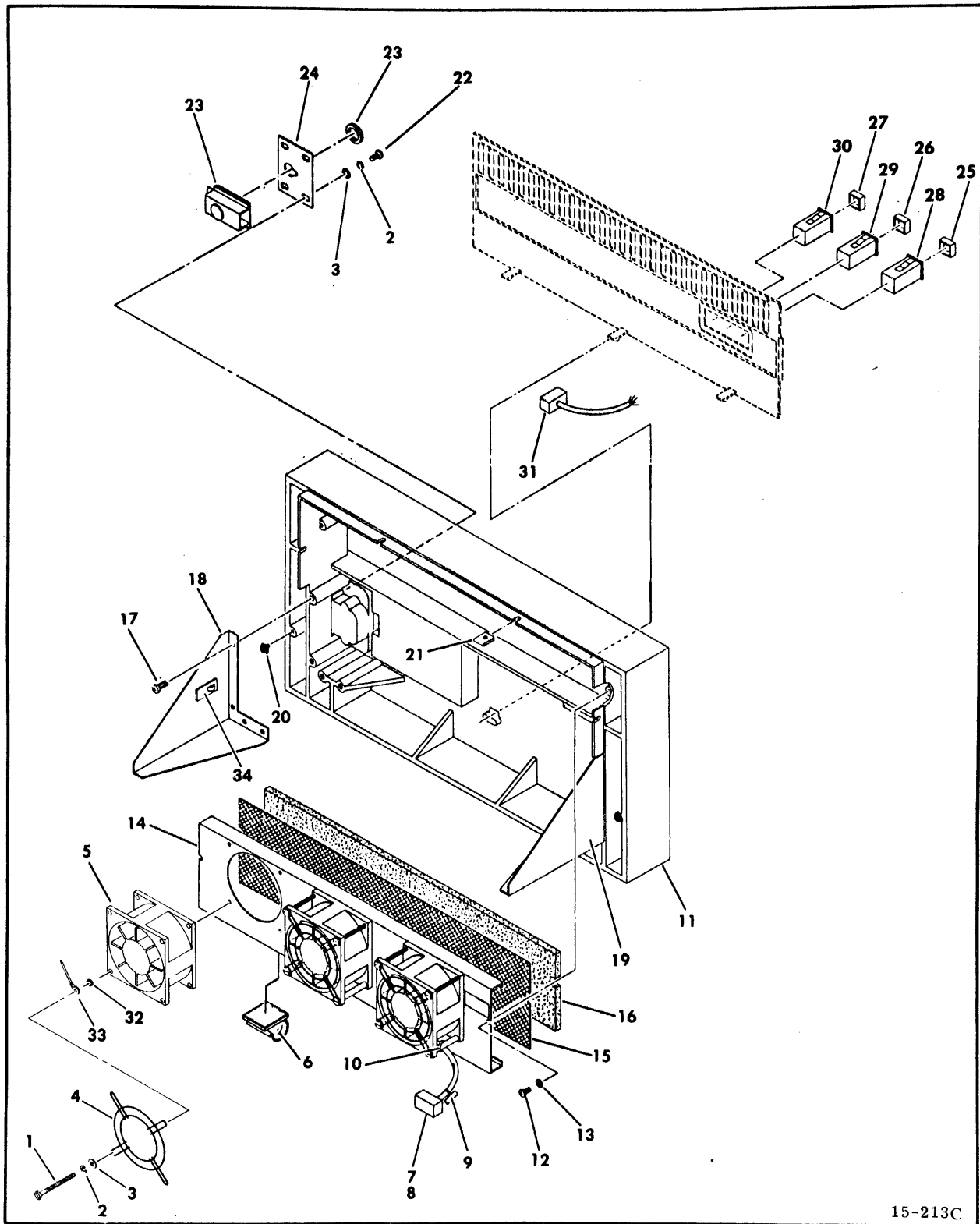


Figure 5-2. Drive Final Assembly

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-2	730355XX	DRIVE FINAL ASSEMBLY	All except BZ5A1J/K/R/S, BZ5A2 C/D/G/H, BZ5A9N/P, BZ9A7C/D/E/F/G
5-2	823994XX	DRIVE FINAL ASSEMBLY	BZ5A9N/P, BZ9A7C/D/ E/F/G
5-2	730639XX	DRIVE FINAL ASSEMBLY	BZ5A1J/K/R/S, BZ5A2C/D/G/H
1	10125301	NUT, Hex, 1/4-20	
2	94388900	LOCKWASHER, Special	
3	73005600	WASHER, Special Flat	
4	73020800	WASHER, Insulator	
5	73020900	BUSHING, Insulator	
6	10127122	SCREW, PHH PNH Mach, 8-32 x 3/8	
7	10126402	LOCKWASHER, #8	
8	##	SPEED TRANSDUCER ASSEMBLY	
9	##	GROUND SPRING	
10	##	MINI MODULE ASSEMBLY	
11	10127132	SCREW, PHH PNH Mach, 10-24 x 1/2	
12	10125805	LOCKWASHER, #10	
13	73045100	WASHER, Special	
14	93660077	SCREW, PHH PNH, 8-32 x 3/8	S/C 15 & Abv
15	94369553	GROUND CABLE	S/C 15-19 only
16	10125804	LOCKWASHER, #8	S/C 15 & Abv
17		FRONT PANEL ASSEMBLY (See Figures 5-3, 5-4, 5-5)	
18	##	BELT, Flat Drive	
19		BASE FRAME ASSEMBLY (See Figures 5-6, 5-7)	
20	94305532	BUSHING	BZ5A1E/G/T/U, BZ9A1C/E/F/N only
21	73040600	CARD CLAMP ASSEMBLY	
	82355115	I/O CABLE ASSEMBLY	BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D only
22	10127114	SCREW, PHH PNH Mach, 6-32 x 1/2	
23	10125803	LOCKWASHER, #6	
24	10125605	WASHER, #6	
25	93564055	WASHER, Nylon	
26		NOT USED	
27		NOT USED	
28	10125105	NUT, Hex, 6-32	
29	93564032	WASHER, Nylon	

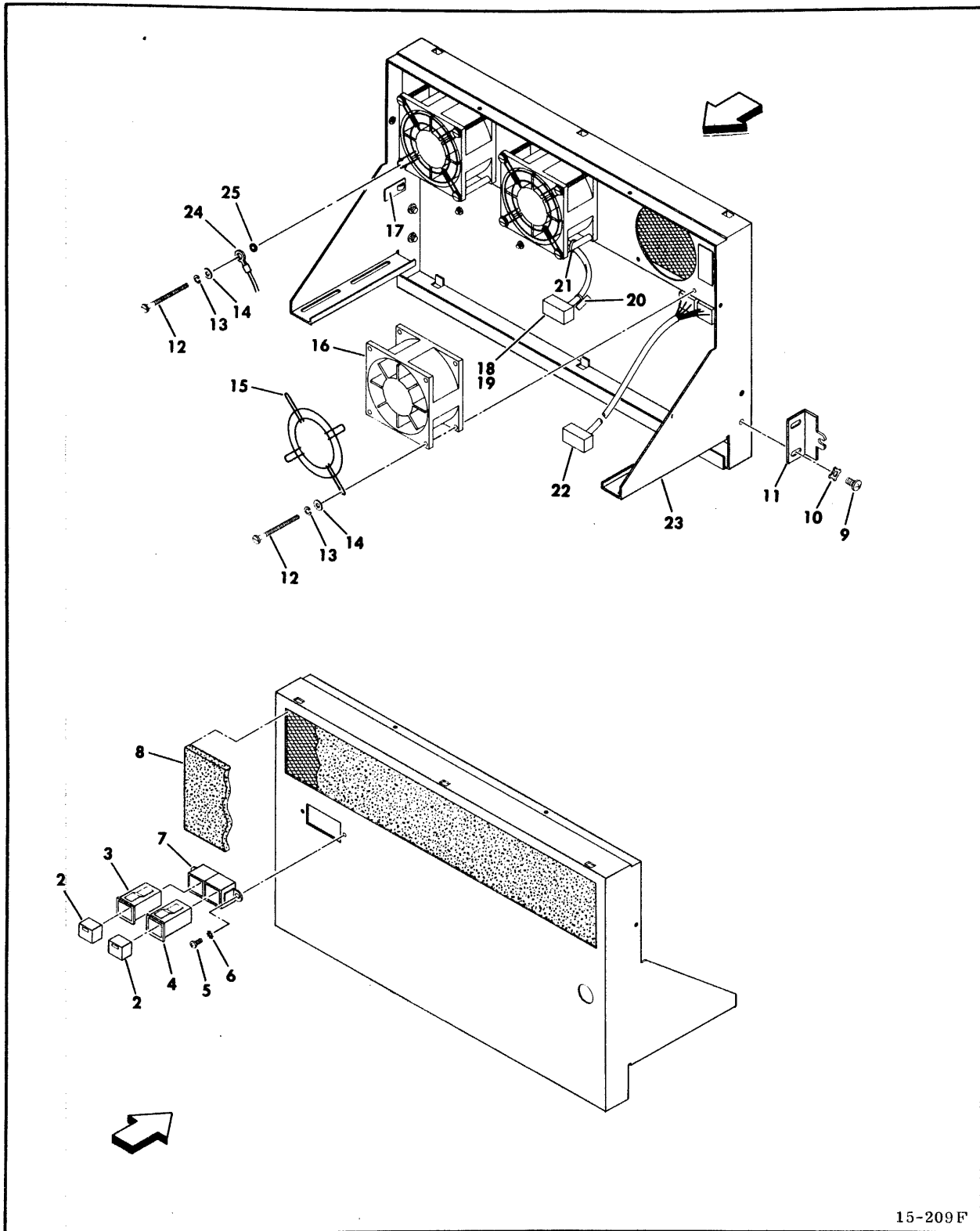


15-213C

Figure 5-3. Front Panel Assembly

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-3		FRONT PANEL ASSEMBLY (Contd)	
26	94394201	LENS, Lettered (Fault Clear)	See Note 5
26	94394253	LENS, Lettered (Fault Clear)	See Note 6
27	94394305	LENS, Blank	See Note 3
27	94394311	LENS, Blank	See Note 4
27	94394230	LENS, Lettered (Ready)	See Note 5
27	94394257	LENS, Lettered (Ready)	See Note 6
28	##	INDICATOR, LED	See Note 7
29	##	SWITCH, P.B. W/LED Indicator	
30	94394007	SWITCH, P.B. W/LED Indicator	See Note 8
30	94394030	SWITCH, P.B. W/LED Indicator	See Note 9
31	73035100	HARNES ASSEMBLY	See Note 7
32	10126103	LOCKWASHER, #6	S/C 20 & Abv only
33	73067200	GROUND WIRE ASSEMBLY	S/C 20 & Abv only
34	94277503	MOUNT, Cable	

- NOTE 1: S/C 25 & Blw all except BZ5A1E/G/T/U, BZ9A1C/E/F/N.
- NOTE 2: S/C 26 & Abv all except BZ5A1E/G/T/U, BZ9A1C/E/F/N.
- NOTE 3: S/C 25 & below all except BZ5A2E/F, BZ5A5J, BZ5A6C/D, BZ9A1J/K, BZ9A2C/D, BZ9A6C/D.
- NOTE 4: S/C 26 & Abv all except BZ5A2E/F, BZ5A5J, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D, BZ9A2C/D, BZ9A6C/D.
- NOTE 5: S/C 25 & Blw BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D.
- NOTE 6: S/C 26 & Abv BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D.
- NOTE 7: All except BZ5A1F.
- NOTE 8: S/C 25 & Blw all except BZ5A5J, BZ9A1J/K.
- NOTE 9: S/C 26 & Abv all except BZ5A5J. S/C 01 & Abv BZ9A1J/K.



15-209F

Figure 5-4. Front Panel Assembly

INDEX NO	PART NO	PART DESCRIPTION	NOTE
5-10		POWER SUPPLY ASSEMBLY (Sheet 2 of 2)	
1	76877701	CHASSIS	All except BZ9A7L
1	76877703	CHASSIS	BZ9A7L
2	10126103	LOCKWASHER, #6	
3	96837908	CIRCUIT BREAKER, 250 V (CB1)	
4	10127113	SCREW, PHH PNH Mach, 6-32 x 3/8	
5	70118701	RFI FILTER ASSEMBLY (LF1)	
6	17901515	SCREW, PHH, 8-32 x 1/4	
7	10126402	LOCKWASHER, #8	
8	93234236	SCREW, PNH Mach, 10-32 x 5/16	
9	95524408	LOCKWASHER, #10	
10	94047081	WASHER, Special	
11	95645626	CAPACITOR, 40 V, 4700 μ F (C2)	
12	10126401	LOCKWASHER, #6	
13	95686705	CAPACITOR, 660 V, 3 μ F (C1)	
14	95655516	SCREW, Sh Met, 6-20 x 3/8	
15	95634801	SPEEDNUT	
16	95510026	NUT, Hex, 6-32	
17	10125613	WASHER, #6	
18	95643600	CLAMP, Capacitor	
19	95582500	BOOT	
20	93749162	SCREW, PHH PNH Mach W/Lockwasher, 6-32 x 3/8	
	92015100	COVER, Insulating	
	92006905	PLATE, Warning, Fuse	
	92006900	PLATE, Warning, High Voltage	

TABLE 5-1. HARDWARE KIT PIECE PARTS

Part Number	Part Description	Kit P/N		
		7 6 8 4 6 3 0 0	7 6 8 4 6 3 0 5	9 2 5 5 5 2 3 8
94386402	MOUNT, Cable	x	x	-
94277425	CABLE TIE	x	x	-
73040500	KEEPER, Latch	x	x	-
10125805	LOCKWASHER, #10	x	x	-
10127143	SCREW, PHH PNH Mach, 10-32 x 1/2	x	x	x
10125108	NUT, Hex, 10-32	x	x	x
##	TERMINATOR ASSEMBLY, AYDV CARD	-	x	-
73040501	KEEPER, Latch	-	-	x
10126502	SCREW, Hex Hd, 1/4-20 x 3/4	-	-	x
10125806	LOCKWASHER, 1/4	-	-	x
10125608	WASHER, 1/4	-	-	x
10126105	LOCKWASHER, #10	-	-	x
10126244	SCREW, SCH, 10-32 x 1/2	-	-	x
92602002	CLAMP, Cable	-	-	x
10125606	WASHER, #8	-	-	x
10126402	LOCKWASHER, #8	-	-	x
10125106	NUT, Hex, 8-32	-	-	x
10127122	SCREW, PHH PNH Mach, 8-32 x 3/8	-	-	x
10125607	WASHER, #10	-	-	x
73069600	BRACKET, Slide	-	-	x
73069601	BRACKET, Slide	-	-	x

NOTE: "x" SIGNIFIES PART IS IN THAT KIT.

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
			<u>KBX COMP ASSY, Loc A2B01/A2C01</u>			BZ5A1V/W, BZ5A5G/H
			AKBX - Used on S/C 13	76971900	76971908	To HKBX-FCO 50967
			DKBX - Used on S/C 14	76971904	76971908	To HKBX-FCO 50967
			EKBX - Used on S/C 15-19	76971905	76971908	To HKBX-FCO 50967
			HKBX - Used on S/C 20 & above	76971908	76971908	
			<u>KBX COMP ASSY, Loc A2B01/A2C01</u>			160 MB units
			AJFX - Used on S/C 09-12	76963900	76971911	
			AKBX - Used on S/C 13	76971900	76971911	
			CKBX - Used on S/C 14-18	76971903	76971911	
			GKBX - Used on S/C 19-24	76971907	76971911	
			LKBX - Used on S/C 25 & above	76971911	76971911	
			<u>FGX COMP ASSY, Loc A2B02/A2C02</u>			80 MB units
			BFGX - Used on S/C 09-12	76935501	76935523	To WFGX-FCO 62212
			HFGX - Used on S/C 13-17	76935508	76935523	To WFGX-FCO 62212
			TFGX - Used on S/C 18-21	76935518	76935523	To WFGX-FCO 62212
			WFGX - Used on S/C 22 & above	76935523	76935523	
			<u>FGX COMP ASSY, Loc A2B02/A2C02</u>			160 MB units
			EFGX - Used on S/C 13-17	76935505	76935524	To XFGX-FCO 62213
			SFGX - Used on S/C 18-21	76935517	76935524	To XFGX-FCO 62213
			XFGX - Used on S/C 22 & above	76935524	76935524	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
			<u>JBX COMP ASSY, Loc A2B03</u>			80 MB units
			- CFCX - Used on S/C 09-12	76933903	76962328	To RJBX-FCO 62112
			AJBX - Used on S/C 13-14	76962300	76962328	To RJBX-FCO 62112
			FJBX - Used on S/C 15	76962306	76962328	To RJBX-FCO 62112
			JJBX - Used on S/C 16-21	76962309	76962328	To RJBX-FCO 62112
			RJBX - Used on S/C 22-23	76962316	76962328	
			YJBX - Used on S/C 24-26	76962323	76962328	
			ADJBX - Used on S/C 27 & above	76962328	76962328	
			<u>JBX COMP ASSY, Loc A2B03</u>			160 MB units
			- EFCX - Used on S/C 09-12	76933906	76962329	To VJBX-FCO 62142
			AJBX - Used on S/C 13	76962300	76962329	To VJBX-FCO 62142
			DJBX - Used on S/C 14-16	76962303	76962329	To VJBX-FCO 62142
			MJBX - Used on S/C 17-22	76962312	76962329	To VJBX-FCO 62142
			VJBX - Used on S/C 23	76962320	76962329	
			ZJBX - Used on S/C 24-26	76962324	76962329	
			AEJBX - Used on S/C 27 & above	76962329	76962329	
			<u>HNX COMP ASSY, Loc A2C03</u>			BZ9A1J/K/L/M, BZ9A5E/F only
			EHNX - Used on S/C 09 & above	76957106	76957106	
			<u>JUMPER PLUG ASSEMBLY (A2C04)</u>			Single Chan units
			Used on S/C 09 & above	47203102	47203102	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
			<u>FBX COMP ASSY, Loc A2C04</u>			
			- AFBX - Used on S/C 09 & above	76933500	76933500	Dual Chan units All except BZ5A2C/D/E/F/G/H, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D
			CFBX - Used on S/C 14-20	76933504	76933508	BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D
			DFBX - Used on S/C 15 & above	76933505	76933505	BZ5A2C/D/G/H
			FFBX - Used on S/C 21 & above	76933508	76933508	BZ5A2E/F, BZ5A6C/D, BZ9A2C/D, BZ9A6C/D/ E/F
			<u>ZSV COMP ASSY, Loc A2C05</u>			
			- AZSV - Used on S/C 09-12	54286500	54286502	To BZSV-FCO 50591
			BZSV - Used on S/C 13-18	54286501	54286502	
			CZSV - Used on S/C 19 & above	54286502	54286502	
			<u>DZV COMP ASSY, Loc A3A1</u>			
			- ADZV - Used on S/C 09 & above	54209300	54209300	
			<u>NSN COMP ASSY, Loc A4A1</u>			
			- BNSN - Used on S/C 09 & above	54086501	54086501	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
			<u> </u> NQN COMP ASSY, Loc A4A2/A4B2			
			ANQN - Used on S/C 09-11	54085700	54085709	To GNQN-FCO 50535
			BNQN - Used on S/C 12	54085701	54085709	To GNQN-FCO 50535
			GNQN - Used on S/C 13-25	54085706	54085709	
			KNQN - Used on S/C 26 & above	54085709	54085709	
			<u> </u> NRN COMP ASSY, Loc A4A3/A4B3			80 MB Units
			ANRN - Used on S/C 09-12	54086100	54086104	To ENRN-FCO 50534
			ENRN - Used on S/C 13 & above	54086104	54086104	
5-2	5-11		<u> </u> NRN COMP ASSY, Loc A4A3/A4B3			160 MB Units
			BNRN - Used on S/C 09-12	54086101	54086107	To FNRN-FCO 50534
			FNRN - Used on S/C 13-14	54086105	54086107	To GNRN-FCO 50632
			GNRN - Used on S/C 15-23	54086106	54086107	
			HNRN - Used on S/C 24 & above	54086107	54086107	
5-2	5-11	8	SPEED TRANSDUCER ASSEMBLY Used on S/C 09 & above	47444800	47444800	
5-2	5-11	9	GROUND SPRING Used on S/C 09 & above	82391100	82391100	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			
			Used on S/C 18-22	73034607	82395210	BZ9A1J/K Replacement re- quires LKBX card
			Used on S/C 23-24	73034613	82395210	Replacement re- quires LKBX card
			Used on S/C 25 & above	82395210	82395210	
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			
			Used on S/C 09-16	73034604	82395215	BZ9A1P/R Replacement requires LKBX card
			Used on S/C 17-22	73034607	82395215	Replacement requires LKBX card
			Used on S/C 23-24	73034613	82395215	Replacement requires LKBX card
			Used on S/C 25	82395200	82395200	
			Used on S/C 26 & above	82395215	82395215	
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			
			Used on S/C 22	73034607	82395213	BZ9A1Y Replacement re- quires LKBX card
			Used on S/C 23-24	73034613	82395213	Replacement re- quires LKBX card
			Used on S/C 25 & above	82395213	82395213	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig.	Page	Index				
No.	No.	No.				
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			BZ9A1Z, BZ9A7G
			Used on S/C 22	73034607	82395208	Replacement re- quires LKBX card
			Used on S/C 23-24	73034613	82395208	Replacement re- quires LKBX card
			Used on S/C 25 & above	82395208	82395208	
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			Moveable + 48 Fixed Heads
			Used on S/C 09-16	73034605	82395201	except BZ9A1L/M Replacement re- quires LKBX card
			Used on S/C 17-22	73034608	82395201	Replacement re- quires LKBX card
			Used on S/C 23-24	73034615	82395201	Replacement re- quires LKBX card
			Used on S/C 25 & above	82395201	82395201	
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			BZ9A1L/M
			Used on S/C 20-22	73034608	82395211	Replacement re- quires LKBX card
			Used on S/C 23-24	73034615	82395211	Replacement re- quires LKBX card
			Used on S/C 25 & above	82395211	82395211	

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			Moveable + 96 Fixed Heads
			Used on S/C 09-16	73034606	82395202	except BZ9A5E/F Replacement re- quires LKBX card
			Used on S/C 17-22	73034609	82395202	Replacement re- quires LKBX card
			Used on S/C 23-24	73034614	82395202	Replacement re- quires LKBX card
			Used on S/C 25 & above	82395202	82395202	Replacement re- quires LKBX card
5-2	5-11	10	MINI MODULE ASSEMBLY (160 MB)			BZ9A5E/F
			Used on S/C 20-22	73034609	82395212	Replacement re- quires LKBX card
			Used on S/C 23-24	73034614	82395212	Replacement re- quires LKBX card
			Used on S/C 25 & above	82396212	82395212	Replacement re- quires LKBX card
5-2	5-11	18	BELT, Flat Drive			
			Used on S/C 09 & above	92314125	92314125	60 Hz
5-2	5-11	18	BELT, Flat Drive			
			Used on S/C 09 & above	92314126	92314126	50 Hz

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-3	5-13	5	FAN ASSEMBLY Used on S/C 09 & above	73019800	73019800	
5-3	5-13	16	AIR FILTER, Foam Used on S/C 09-11 Used on S/C 12 & above	94364904 73045700	73045700 73045700	
5-3	5-15	28	INDICATOR, LED Used on S/C 09-25 Used on S/C 09-25 Used on S/D 26 & above	94394101 94394114 94394114	94394101 94394114 94394114	All except BZ9A1J/K BZ9A1J/K
5-3	5-15	29	SWITCH P.B PANEL W/LED Indicator Used on S/C 09-25 Used on S/C 09-25 Used on S/C 26 & above	94394000 94394028 94394028	94394000 94394028 94394028	All except BZ9A1J/K BZ9A1J/K
5-4	5-17	3	INDICATOR, LED Used on S/C 17-25 Used on S/C 26 & above	94394101 94394114	94394101 94394114	BZ5A1E, BZ9A1C

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-4	5-17	4	SWITCH, P.B. W/LED Indicator Used on S/C 17-25 Used on S/C 26 & above	94394000 94394028	94394000 94394028	BZ5A1E, BZ9A1C
5-4	5-17	8	AIR FILTER, Foam Used on S/C 17 & above	73045702	73045702	BZ5A1E, BZ9A1C
5-4	5-17	16	FAN ASSEMBLY Used on S/C 17 & above	73019800	73019800	BZ5A1E, BZ9A1C
5-5	5-19	3	SWITCH, P.B. W/LED Indicator Used on S/C 17-25 Used on S/C 26 & above	94394000 94394028	94394000 94394028	BZ5A1G/T/U, BZ9A1E/ F/N
5-5	5-19	8	AIR FILTER, Foam Used on S/C 17 & above	73045701	73045701	BZ5A1G/T/U, BZ9A1E/F/N
5-5	5-19	16	FAN ASSEMBLY Used on S/C 17 & above	73019800	73019800	BZ5A1G/T/U, BZ9A1E/F/N

ENGINEERING RECOMMENDED SPARE PARTS LIST

ITEMS APPEAR ON			DESCRIPTION	PART NUMBER	REPLACE- MENT PART NUMBER	NOTES
Fig. No.	Page No.	Index No.				
5-5	5-19	24	INDICATOR, LED			BZ5A1G/T/U, BZ9A1E/F/N
			Used on S/C 17-25	94394101	94394101	
			Used on S/C 26 & above	94394114	94394114	
5-9	5-33		MOTOR & BRAKE ASSEMBLY			80 MB, 60 Hz Units
			Used on S/C 09-16	73035301	73035315	
			Used on S/C 17-20	73035306	73035315	
			Used on S/C 21 & above	73035315	73035315	Except BZ5A1E/L
			Used on S/C 21 & above	73035324	73035324	BZ5A1E
			Used on S/C 28 & above	73035326	73035326	BZ5A1L
5-9	5-33		MOTOR & BRAKE ASSEMBLY			80 MB, 50 Hz Units
			Used on S/C 09-16	73035302	73035307	
			Used on S/C 17-20	73035307	73035307	
			Used on S/C 21 & above	73035316	73035316	
5-9	5-33		MOTOR & BRAKE ASSEMBLY			160 MB, 60 Hz Units
			Used on S/C 09-12	73035303	73035306	
			Used on S/C 13-16	73035301	73035306	
			Used on S/C 17-20	73035306	73035306	
			Used on S/C 21 & above	73035315	73035315	Except BZ9A1C, BZ9A7L
			Used on S/C 21 & above	73035324	73035324	BZ9A1C
			Used on S/C 21 & above	73035326	73035326	BZ9A7L

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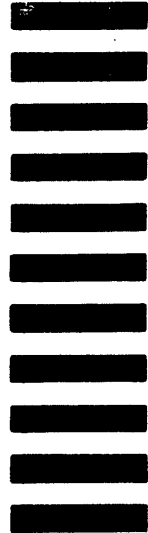
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