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Colin Hinson
In the village of Blunham, Bedfordshire.

SPDU018

XDS Memory Expansion

XDS Extended Development Support
Installation and Operation Guide

TEXAS INSTRUMENTS

PREFACE

The purpose of this manual is to familiarize the user with the functions and theory of the Memory Expansion board. The Memory Expansion Board is an optional circuit card for the XDS that greatly increases the capabilities of the system. This manual also describes installation instructions for the Memory Expansion board, part number 2311050-0001. The user and installer should read this manual before attempting to operate or install the Memory Expansion board. If the Memory Expansion board is removed form the XDS, this manual should be kept with the board for reference during future installation.

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SECTION 1

INSTALLATION

1.1 INTRODUCTION

The Memory Expansion board is an option that significantly increases the emulationg power of the XDS, (Extended Development Support System). Since not all emulators contain their full range of memory on the emulator board, this board allows memory to be expanded. This allows you to use known memory (in the emulator) that is completely under control of the emulator. The Memory Expansion board contains 128K Bytes (8 bits) of memory. Information on the use of the Memory Expansion board can be found in the emulator user's guide. The Memory Expansion board also contains the communications hardware for the XDS. Information on setting up the communications section of the board can be found in the XDS installation and operation guide. Note that this board is not an option for the XDS Model 11. This section should be referenced if the Memory Expansion board is not installed or it is to be moved.

1.1.1 Board Preperation and Installation.

The Memory Expansion board does not require any special preperation for use. The communications section of the board requires switches to be set and a jumper plug to be installed. This information is can be referenced in the appropriate XDS Installation and Operation Guide.

1.1.1.1 Board Configuration.

The Memory Expansion board is available in two configurations. The second configuration is called the communications board and is designed for emulators that do not require memory expansion. The communications board (PN 2311050-0002) contains no memory. Table 1-1 describes which configuration is used with each emulator system. The part number of the Memory Expansion board determines how the board is configured and which emulators it will support. This board is not field convertable from one configuraton to another. The communicaiton board may be used with emulators that use the memroy expansion option with the loss of the memory expansion

features. Figure 1-1 shows the memory expansion board and the switches and jumper for the communications seciton.

Table 1-1 Memory Expansion Board Configurations

Part Number	Emulator Type
2311050-0001	TMS99000
2311050-0001	TMS9995
2311050-0002	TMS32010
2311050-0002	TMS7000

1.1.2 Board Installation.

CAUTION

BEFORE INSTALLING OR REMOVING ANY BOARD, TURN OFF THE POWER TO THE XDS UNIT.

The XDS Model XX Installation and Operation Guide describes the procedure for installing or removing boards from the XDS unit. Refer to the manual appropriate for the XDS Model you are using. If an memory expansion/comm board is currently installed in the XDS it must be removed before another one can be installed. Only one memory expansion/comm board can be installed at any one time for the XDS to funciton properly. The memory expansion/conn board must be installed in slot number 4. The memory expansion or communications board is not an available option with the XDS Model 11.

Boards removed from the chassis should be stored so that they are protected from static discharge. Erase the board information on the chassis configuration label for each circuit board removed.

For the Memory Expansion board enter the following information on the chassis configuration label for slot number 4 as given in Table 1-2.

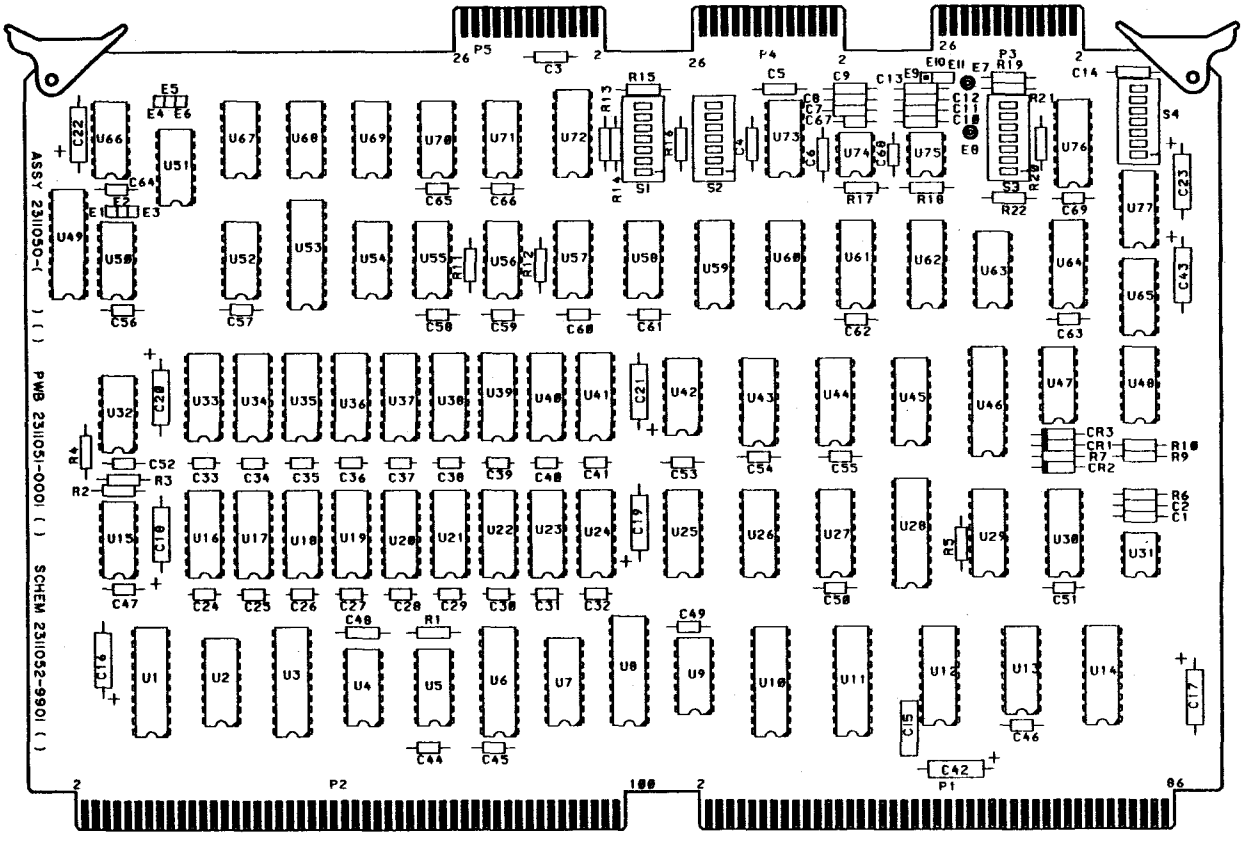


Figure 1-1 Memory Expansion Board PN 2311050

Table 1-2 Chassis Configuraiton Label Information

Block Title	Information to be Entered
PWB Description	MEMORY EXPANSION or COMMUNICATIONS
Part No	2311050-0001 OR 2311050-0002
REV	ENTER REVISION LETTER FRON MEMORY EXPANSION OR COMM BOARD.

1.1.2.1 Installation Completion.

Complete the installation according to the information in the appropriate XDS installation and operation Guide. Note that cabling is required to the board in the chassis.

CAUTION

DO NOT OPERATE THE XDS UNIT WITH THE FRONT PANEL REMOVED. THE FRONT PANEL IS REQUIRED FOR PROPER AIR CIRCULATION AND COOLING OF THE CIRCUIT BOARDS. THE FRONT PANEL IS ALSO REQUIRED TO PREVENT LEAKAGE OF RFI/EMI RADIATION.

Restore power to the XDS unit. Refer to the appropriate emulator user's guide for further instructions on operating the XDS.

SECTION 2

HARDWARE FEATURES

2.1 INTRODUCTION

The memory expansion board operates primarily with the emulator software that is referenced in the appropriate emulator user's guide. Also the features and applications of expansion memory are discussed in the emulators user's guide. The communicaitons secton is discussed in the XDS Installation and Operation Guide. The power requirements are discussed below.

2.1.1 Power Requirements.

The DC power requirements for the Memory Expansion board are given in Table 2-1. This information may be used to calculate the total DC power requirements of the XDS system. When adding new boards to the system this DC Power calculation should be made to ensure that the XDS power supply will not be overloaded. Refer to the XDS Installation and Operation Manual for the power supply rating information, and the power requirements for the other circuit boards may be obtained from their appropriate reference manuals. The DC power available to the user from the XDS chassis takes into account that their will always be a communications board present; therefore only the power required for the memory expansion part of the boared is needed for total DC power calculations.

Table 2-1 Memory Expansion DC Power Requirements

+ 5 VOLTS (AMPS)	+ 12 VOLTS (AMPS)	- 12 VOLTS (AMPS)
1.00	.2	.1

2.2 Block Diagram

Figure 2-1 shows a block diagram of the memory expansion board. The major blocks are the DRAM memory bank and the memory and address controllers.

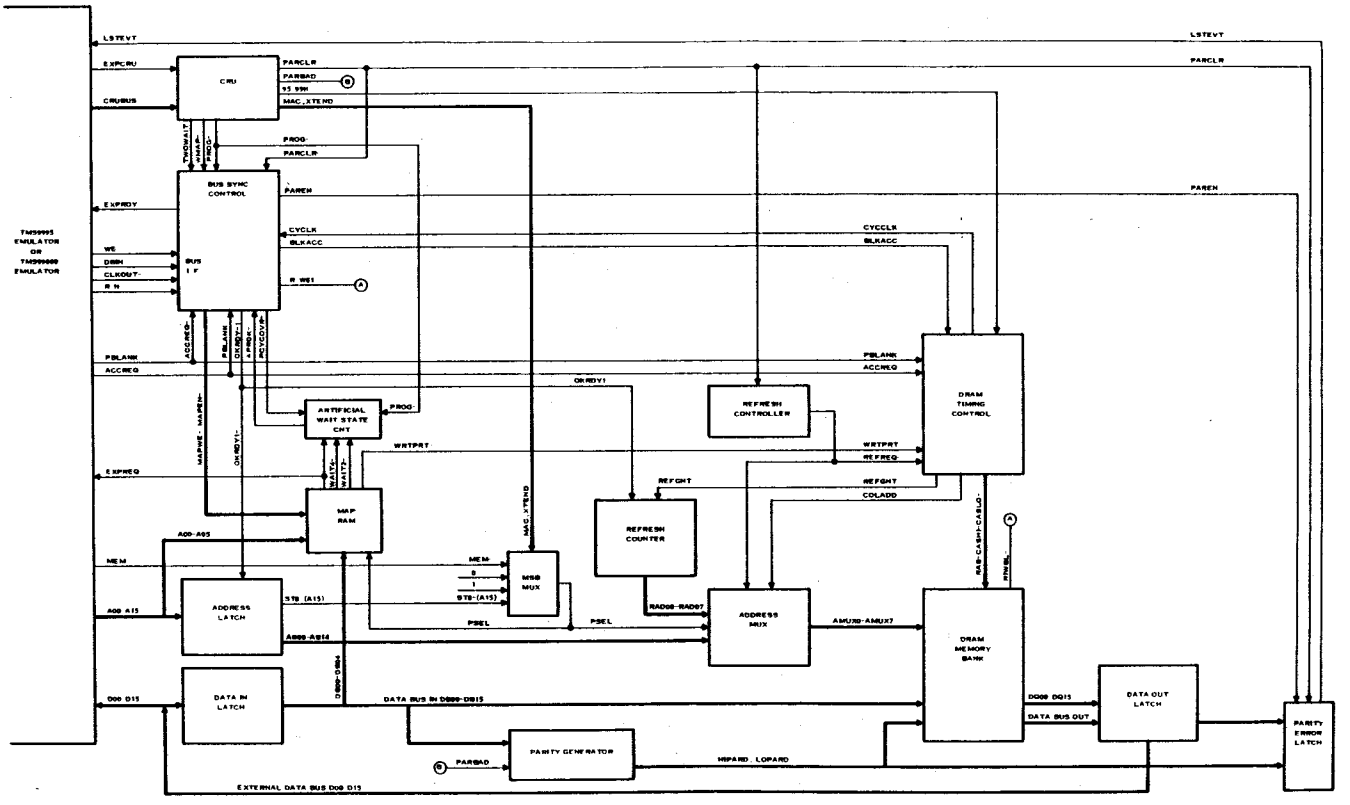


Figure 2-1 Memory Expansion Board Block Diagram

APPENDIX A

Memory Expansion Board Schematics

REVISIONS

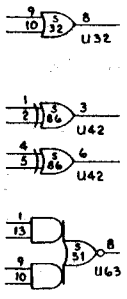
REV	DESCRIPTION	DATE	APPROVED

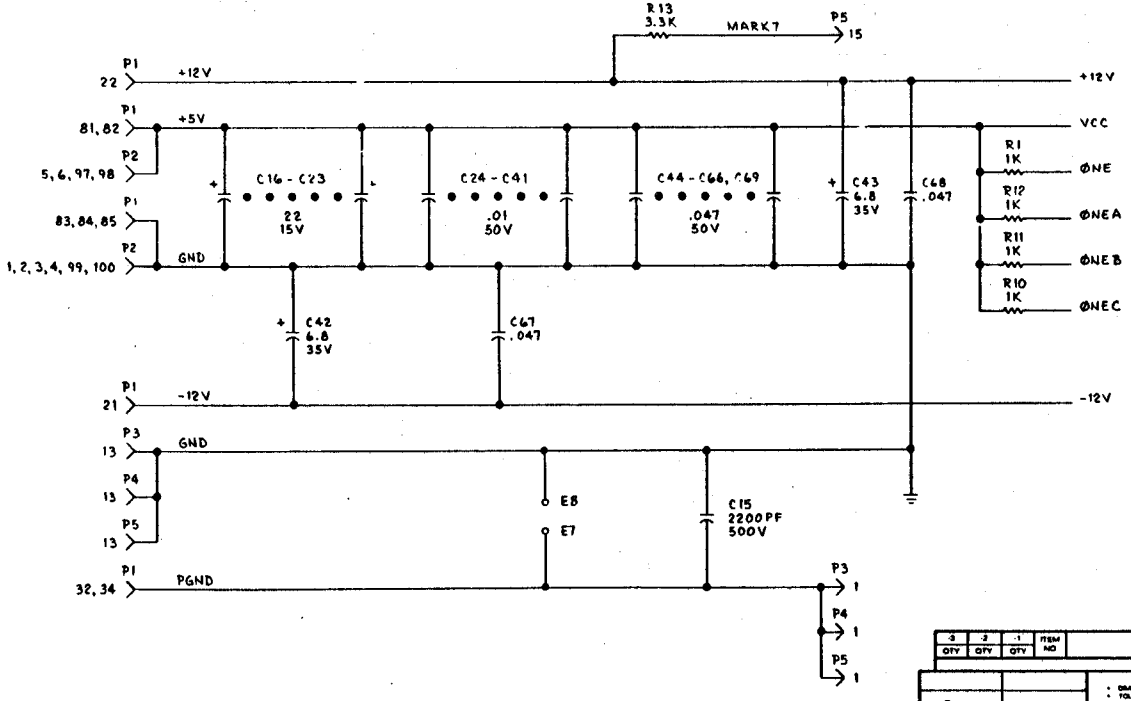
NOTES: UNLESS OTHERWISE SPECIFIED:
1. ALL DEVICE TYPES ARE PREFIXED WITH SN74.
2. VCC IS APPLIED TO PIN 8 OF ALL 8-PIN IC'S, PIN 14 OF ALL 14-PIN IC'S, PIN 16 OF ALL 16-PIN IC'S, PIN 20 OF ALL 20-PIN IC'S, ETC.
3. GROUND IS APPLIED TO PIN 4 OF ALL 8-PIN IC'S, PIN 7 OF ALL 14-PIN IC'S, PIN 8 OF ALL 16-PIN IC'S, PIN 10 OF ALL 20-PIN IC'S, ETC.
4. DEVICE TYPE, PIN NUMBERS, AND REFERENCE DESIGNATOR OF IC IS SHOWN AS FOLLOWS:

LS00 AND LS04 = DEVICE TYPE
1, 2, AND 3 = PIN NUMBERS
U2 AND U14 = REFERENCE DESIGNATOR

5. RESISTANCE VALUES ARE IN OHMS.
6. RESISTORS ARE ¼ WATT, 5%.
7. CAPACITANCE VALUES ARE IN MICROFARADS.
8. MSB/LSB DEFINITIONS:
   A00 = MSB D00 = MSB
   A15 = LSB D15 = LSB

SPARES





1-7-83
5-16-83
3-1-83

-3 QTY	-2 QTY	-1 QTY	ITEM NO	PART OR IDENTIFYING NUMBER	NOMENCLATURE OR DESCRIPTION	NOTES

PARTS LIST

UNLESS OTHERWISE SPECIFIED
- DIMENSIONS ARE IN MILLIMETERS
- TOLERANCES: 2 PLACE DECIMALS ±0.25
- 1 PLACE DECIMALS ±0.5 ANGLES ±1°
- INTERPRET DRAWING PER ASME Y14.5M-1982
- REMOVE ALL BURRS AND SHARP EDGES
- CONCENTRICITY MACHINED DIAMETERS 0.25 FIM
- DIMENSIONAL LIMITS APPLY BEFORE PROCESSING
- PARENTHETICAL INFO FOR REF ONLY

HOLE TOLERANCE	
0.32 THRU 3.18	+0.10 -0.00
3.20 THRU 6.35	+0.13 -0.03
6.38 THRU 12.70	+0.18 -0.03
12.73 THRU 19.05	+0.20 -0.03
19.08 THRU 25.40	+0.25 -0.03
25.43 THRU 50.80	+0.30 -0.03

THIRD ANGLE PROJECTION

DRW C. KEELER DATE 1-27-83
CHK
ENGR
SPVR/PGMR
QA
APVD/MFG
RLSE

TEXAS INSTRUMENTS SI-METRIC

LOGIC DIAGRAM, 95/99K MEMORY EXPANSION

SIZE D | FSCM NO 06668 | DRAWING NO 2311052

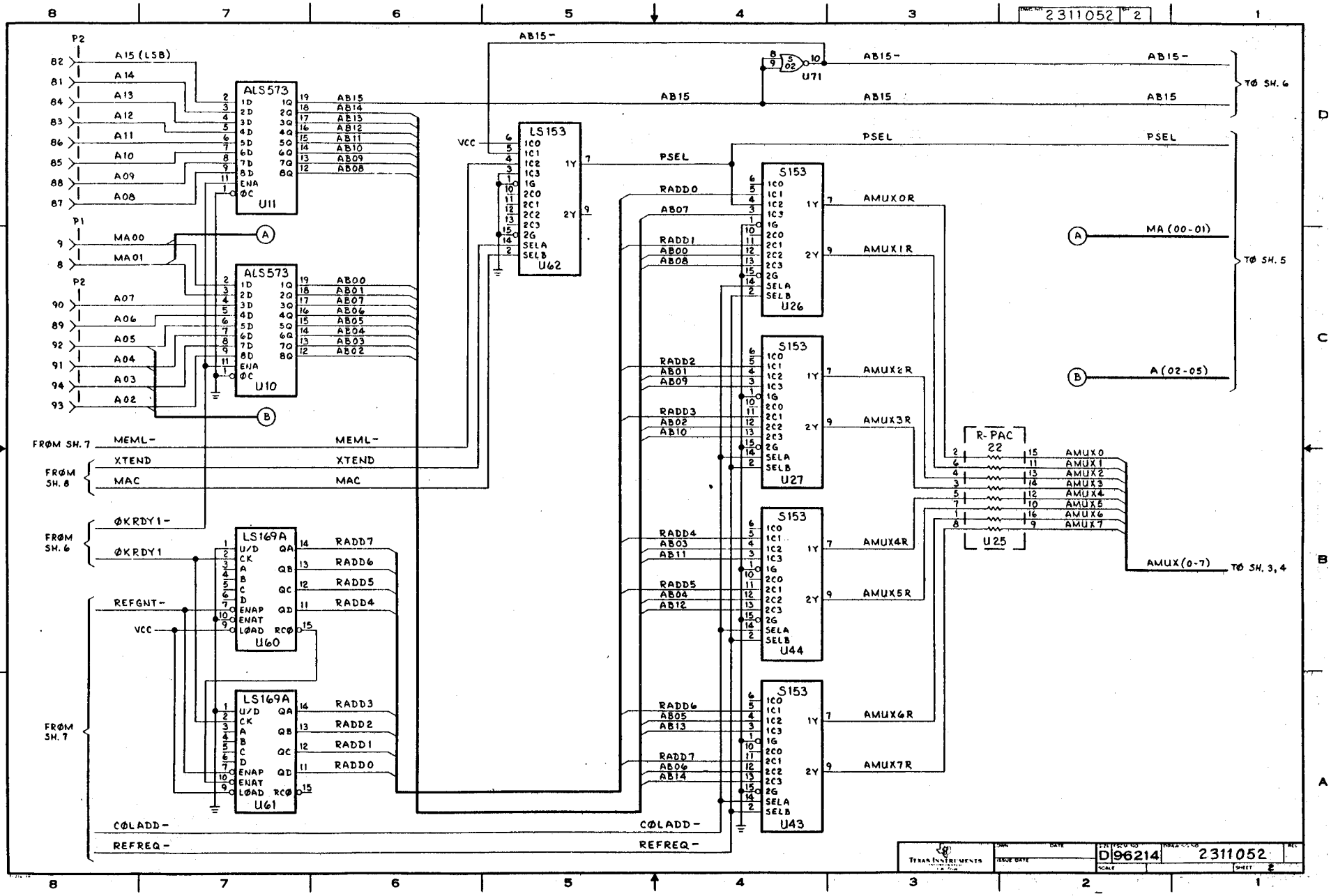
SCALE 1/2 | SHEET 1 OF 2

2311050	7119
NEXT ASSY	USED ON
APPLICATION	

SEQ NO	EVENT	SPEC	NO	ADDITIONAL	NOTES
	PROCESS			CLASSIFICATION	

PROCESSES - IN CONFORMANCE TO GOVT IND SPECIFICATIONS SEE TI DRAWING 729487

REV STATUS OF SHEETS | REV | SH | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |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P2
A15 (LSB)
A14
A13
A12
A11
A10
A09
A08
ALS573
U11
P1
MA00
MA01
ALS573
U10
AB15
AB14
AB13
AB12
AB11
AB10
AB09
AB08
AB00
AB01
AB07
AB06
AB05
AB04
AB03
AB02
AB15-
U71
TØ SH. 6
LS153
U62
VCC
PSEL
S153
U26
RADD0
AB07
RADD1
AB00
AB08
AMUX0R
AMUX1R
MA (00-01)
TØ SH. 5
A (02-05)
S153
U27
RADD2
AB01
AB09
RADD3
AB02
AB10
AMUX2R
AMUX3R
S153
U44
RADD4
AB03
AB11
RADD5
AB04
AB12
AMUX4R
AMUX5R
S153
U43
RADD6
AB05
AB13
RADD7
AB06
AB14
AMUX6R
AMUX7R
R-PAC
22
U25
AMUX0
AMUX1
AMUX2
AMUX3
AMUX4
AMUX5
AMUX6
AMUX7
AMUX(0-7)
TØ SH. 3, 4
FRØM SH. 7
MEML-
XTEND
FRØM SH. 8
MAC
ØKRDY1-
FRØM SH. 6
ØKRDY1
REFGNT-
VCC
FRØM SH. 7
LS169A
U60
LS169A
U61
CØLADD-
REFREQ-
TEXAS INSTRUMENTS
D 96214
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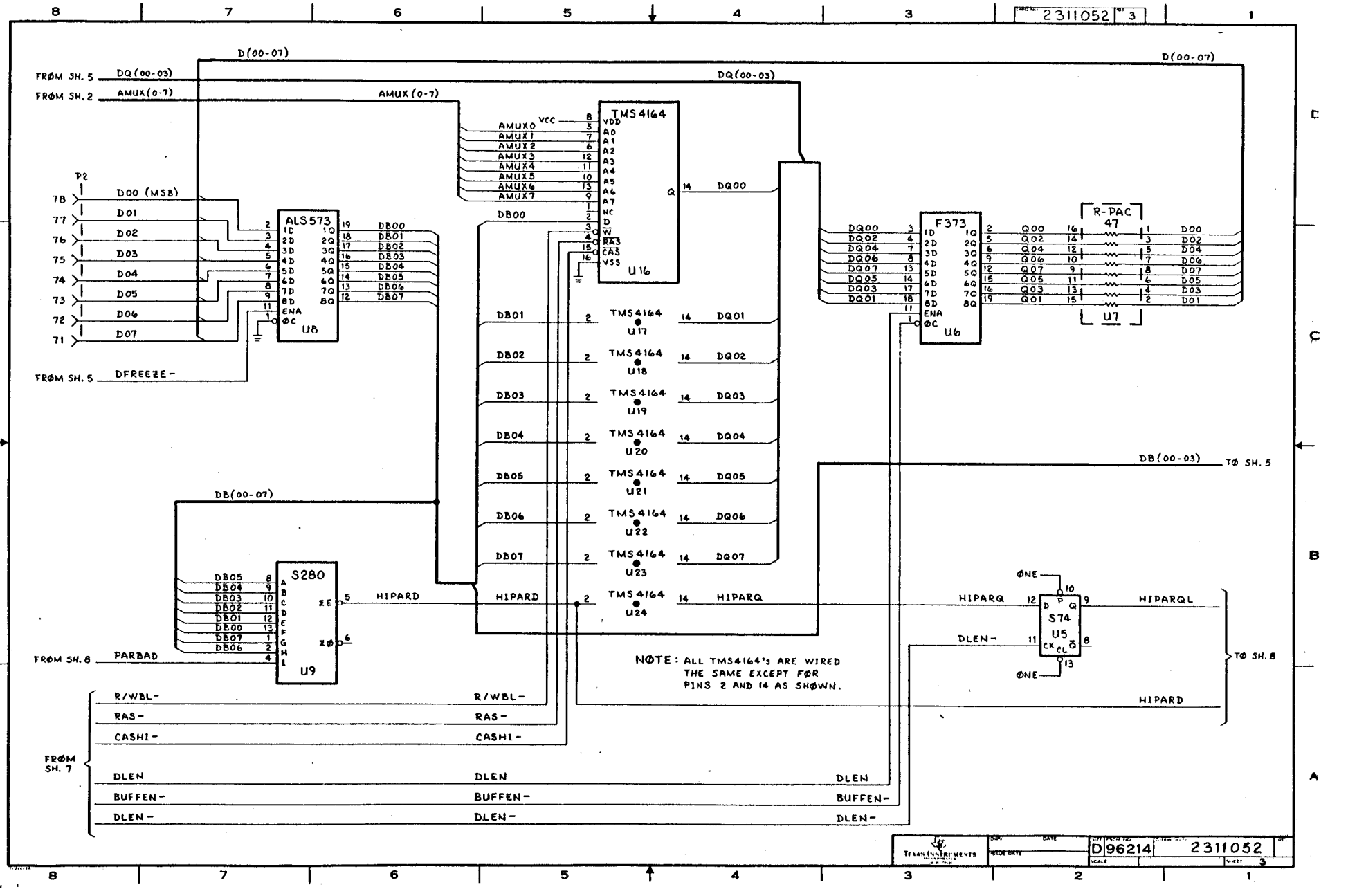
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3
D(00-07)
FROM SH. 5 DQ(00-03)
FROM SH. 2 AMUX(0-7)
AMUX(0-7)
DQ(00-03)
P2
78 D00 (MSB)
77 D01
76 D02
75 D03
74 D04
73 D05
72 D06
71 D07
ALS573
U8
DB00
DB01
DB02
DB03
DB04
DB05
DB06
DB07
FROM SH. 5 DFREEZE-
TMS4164
U16
AMUX0
AMUX1
AMUX2
AMUX3
AMUX4
AMUX5
AMUX6
AMUX7
VCC
VDD
A0
A1
A2
A3
A4
A5
A6
A7
NC
D
W
RAS
CAS
VSS
Q
DQ00
DB00
DB01
DB02
DB03
DB04
DB05
DB06
DB07
HIPARD
TMS4164
U17
U18
U19
U20
U21
U22
U23
U24
DQ01
DQ02
DQ03
DQ04
DQ05
DQ06
DQ07
HIPARQ
F373
U6
1D 2D 3D 4D 5D 6D 7D 8D ENA ØC
1Q 2Q 3Q 4Q 5Q 6Q 7Q 8Q
Q00 Q02 Q04 Q06 Q07 Q05 Q03 Q01
R-PAC
47
U7
D00 D02 D04 D06 D07 D05 D03 D01
DB(00-03) TØ SH. 5
DB(00-07)
S280
U9
DB05 DB04 DB03 DB02 DB01 DB00 DB07 DB06
ΣE
ΣØ
HIPARD
FROM SH. 8 PARBAD
NØTE: ALL TMS4164's ARE WIRED THE SAME EXCEPT FØR PINS 2 AND 14 AS SHØWN.
ØNE
S74
U5
HIPARQ
HIPARQL
DLEN-
HIPARD
TØ SH. 8
FROM SH. 7
R/WBL-
RAS-
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BUFFEN-
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D96214
2311052
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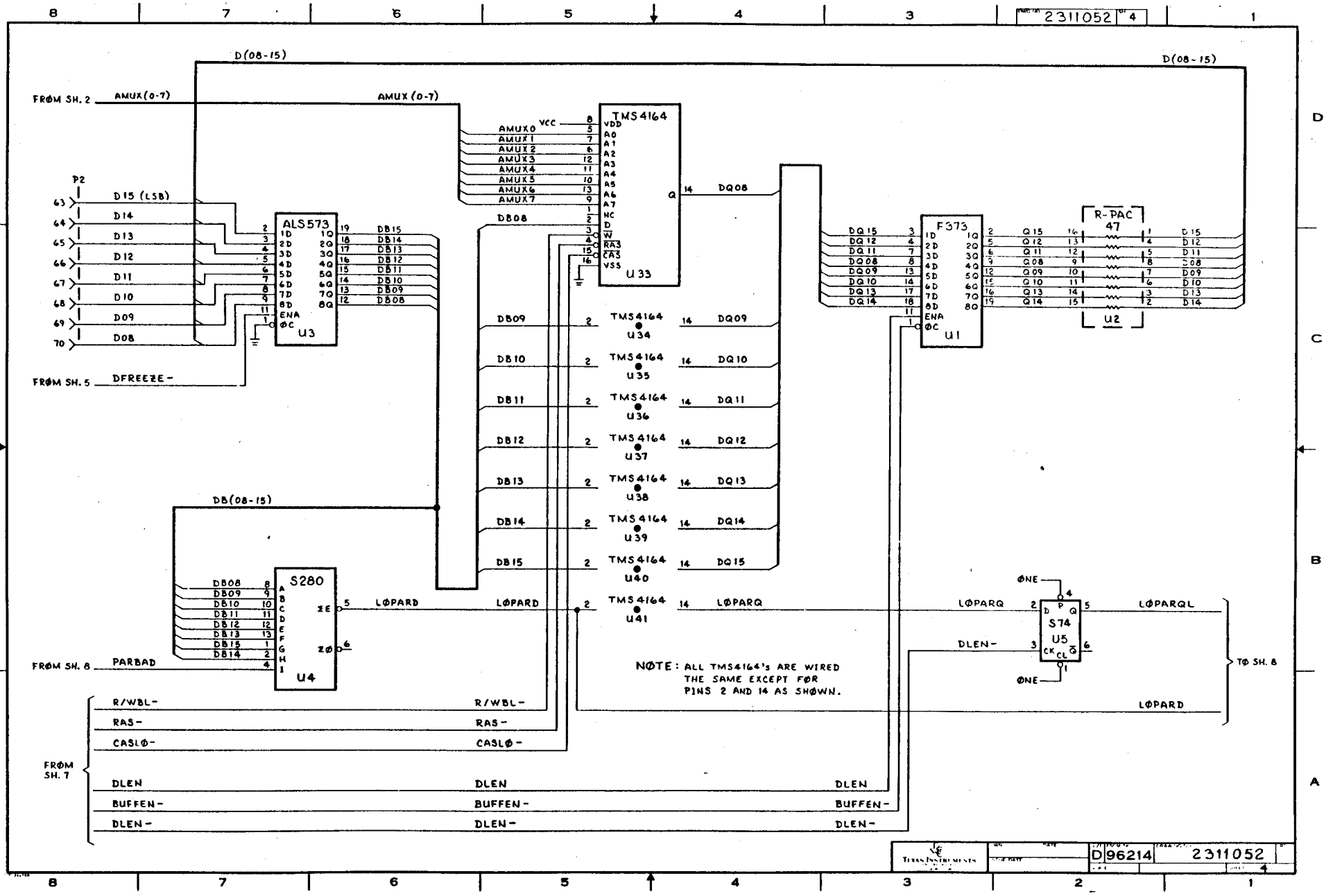
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D(08-15)
FROM SH. 2
AMUX(0-7)
AMUX (0-7)
TMS4164
U33
VCC
AMUX0
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AMUX2
AMUX3
AMUX4
AMUX5
AMUX6
AMUX7
DB08
DQ08
P2
D15 (LSB)
D14
D13
D12
D11
D10
D09
D08
ALS573
U3
FROM SH. 5
DFREEZE-
DB09
DB10
DB11
DB12
DB13
DB14
DB15
TMS4164
U34
U35
U36
U37
U38
U39
U40
U41
DQ09
DQ10
DQ11
DQ12
DQ13
DQ14
DQ15
DQ08
F373
U1
R-PAC
47
U2
D15
D12
D11
D08
D09
D10
D13
D14
DB(08-15)
S280
U4
FROM SH. 8
PARBAD
LØPARD
LØPARQ
ØNE
S74
U5
DLEN-
LØPARQL
TØ SH. 8
NØTE: ALL TMS4164's ARE WIRED THE SAME EXCEPT FØR PINS 2 AND 14 AS SHØWN.
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CASLØ-
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BUFFEN-
DLEN-
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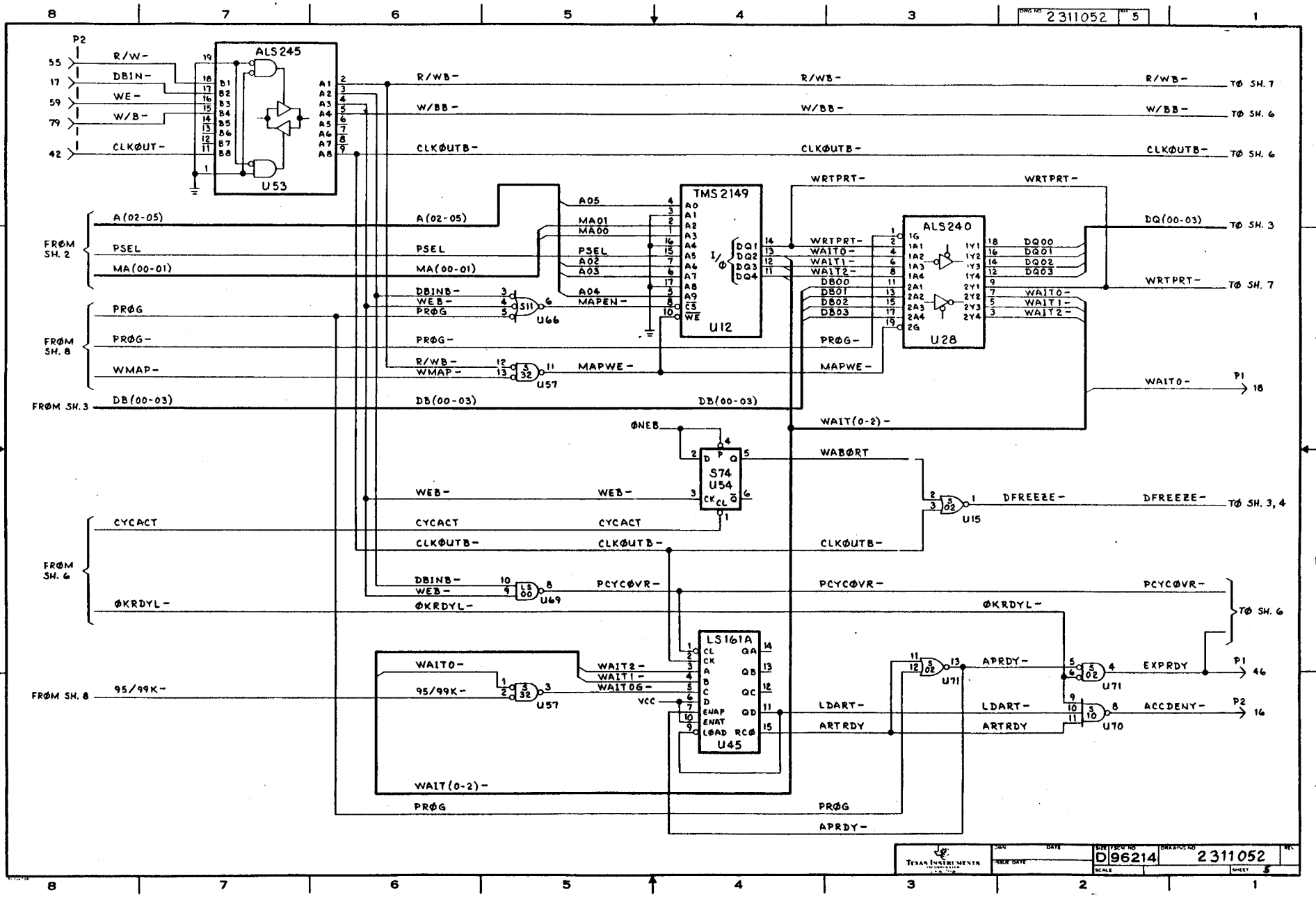
A-6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17 DBIN-
59 WE-
79 W/B-
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W/BB-
CLKØUTB-
TØ SH. 7
TØ SH. 6
TØ SH. 6
A(02-05)
PSEL
MA(00-01)
FRØM SH. 2
A05
MA01
MA00
PSEL
A02
A03
A04
MAPEN-
TMS2149
U12
DBINB-
WEB-
PRØG
S11
U66
PRØG-
FRØM SH. 8
R/WB-
WMAP-
S32
U57
MAPWE-
DB(00-03)
FRØM SH. 3
WRTPRT-
WAIT0-
WAIT1-
WAIT2-
DB00
DB01
DB02
DB03
ALS240
U28
DQ(00-03)
TØ SH. 3
WRTPRT-
TØ SH. 7
WAIT0-
P1 18
WAIT(0-2)-
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S74
U54
WABØRT
WEB-
CYCACT
CLKØUTB-
FRØM SH. 6
S02
U15
DFREEZE-
TØ SH. 3, 4
DBINB-
WEB-
LS00
U69
PCYCØVR-
ØKRDYL-
TØ SH. 6
WAIT0-
95/99K-
FRØM SH. 8
WAIT2-
WAIT1-
WAIT0G-
VCC
LS161A
U45
LDART-
ARTRDY
APRDY-
EXPRDY
P1 46
ACCDENY-
P2 16
U71
U70
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APRDY-
A-7
TEXAS INSTRUMENTS
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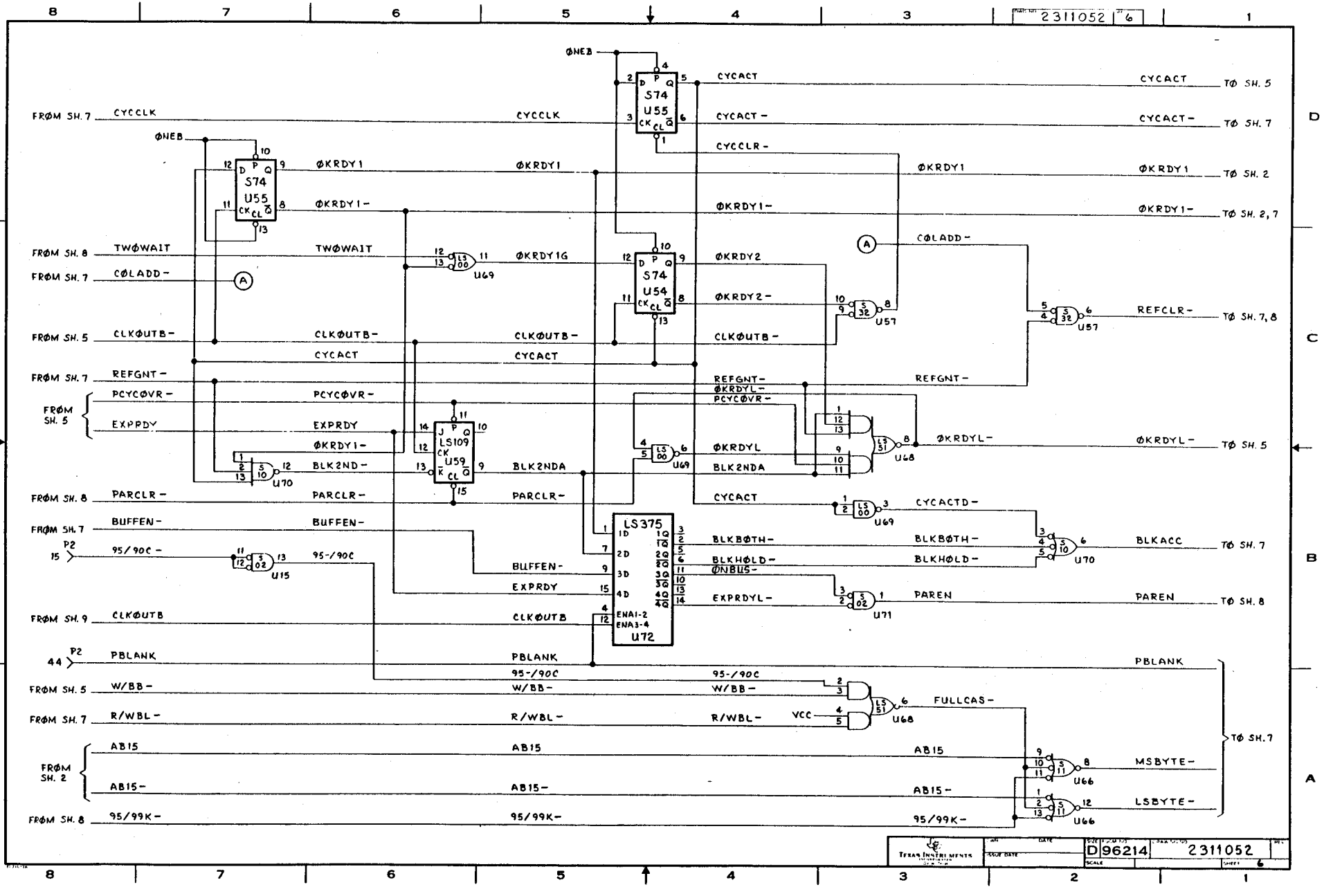
2311052
SHEET 5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TWØWAIT
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ØKRDY2-
CØLADD-
CLKØUTB-
REFGNT-
PCYCØVR-
EXPRDY
BLK2ND-
BLK2NDA
PARCLR-
BUFFEN-
95/90C-
95-/90C
EXPRDY
CLKØUTB
PBLANK
W/BB-
R/WBL-
AB15
AB15-
95/99K-
ØKRDYL-
BLKBØTH-
BLKHØLD-
ØNBUS-
EXPRDYL-
CYCACTD-
PAREN
FULLCAS-
MSBYTE-
LSBYTE-
REFCLR-
FROM SH. 7
FROM SH. 8
FROM SH. 5
FROM SH. 9
FROM SH. 2
TØ SH. 5
TØ SH. 7
TØ SH. 2
TØ SH. 2, 7
TØ SH. 7, 8
TØ SH. 5
TØ SH. 8
S74 U55
S74 U54
LS109 U59
LS375 U72
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U70
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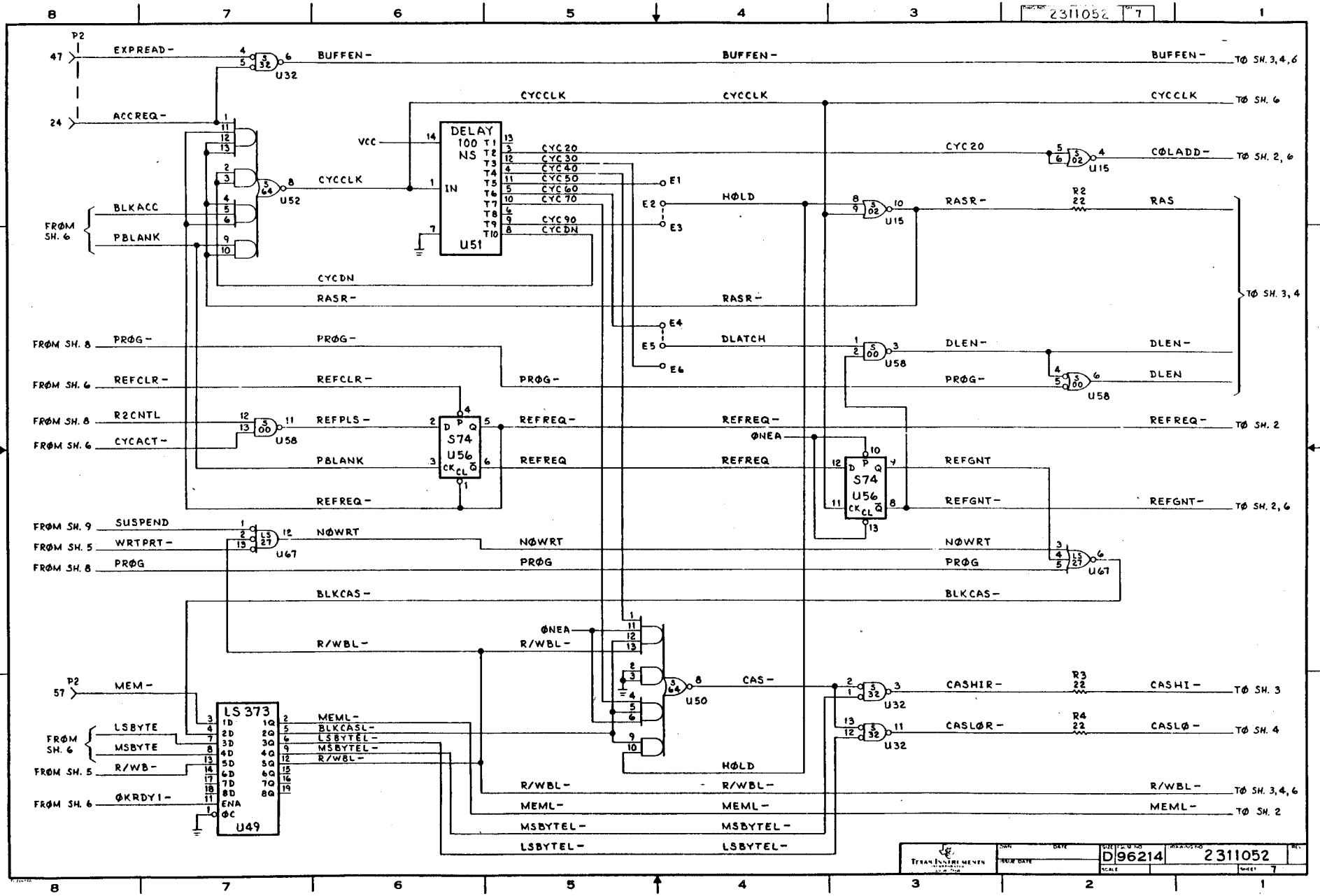
U71
U72
P2 15
P2 44
VCC


2311052 7
P2
47
EXPREAD-
U32
BUFFEN-
TØ SH. 3,4,6
24
ACCREQ-
CYCCLK
TØ SH. 6
VCC
DELAY
100
NS
IN
U51
CYC 20
CYC 30
CYC 40
CYC 50
CYC 60
CYC 70
CYC 90
CYCDN
E1
E2
E3
E4
E5
E6
U52
FROM SH. 6
BLKACC
PBLANK
HØLD
RASR-
U15
R2
22
RAS
TØ SH. 3, 4
FROM SH. 8
PRØG-
DLATCH
U58
DLEN-
DLEN
FROM SH. 6
REFCLR-
FROM SH. 8
R2CNTL
FROM SH. 6
CYCACT-
REFPLS-
S74
U56
REFREQ-
REFREQ
TØ SH. 2
ØNEA
REFGNT
REFGNT-
TØ SH. 2, 6
FROM SH. 9
SUSPEND
FROM SH. 5
WRTPRT-
FROM SH. 8
PRØG
U67
NØWRT
BLKCAS-
R/WBL-
U50
CAS-
CASHIR-
R3
CASHI-
TØ SH. 3
U32
CASLØR-
R4
CASLØ-
TØ SH. 4
P2
57
MEM-
FROM SH. 6
LSBYTE
MSBYTE
FROM SH. 5
R/WB-
FROM SH. 6
ØKRDY1-
LS 373
U49
MEML-
BLKCASL-
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TØ SH. 3,4,6
TØ SH. 2
TEXAS INSTRUMENTS
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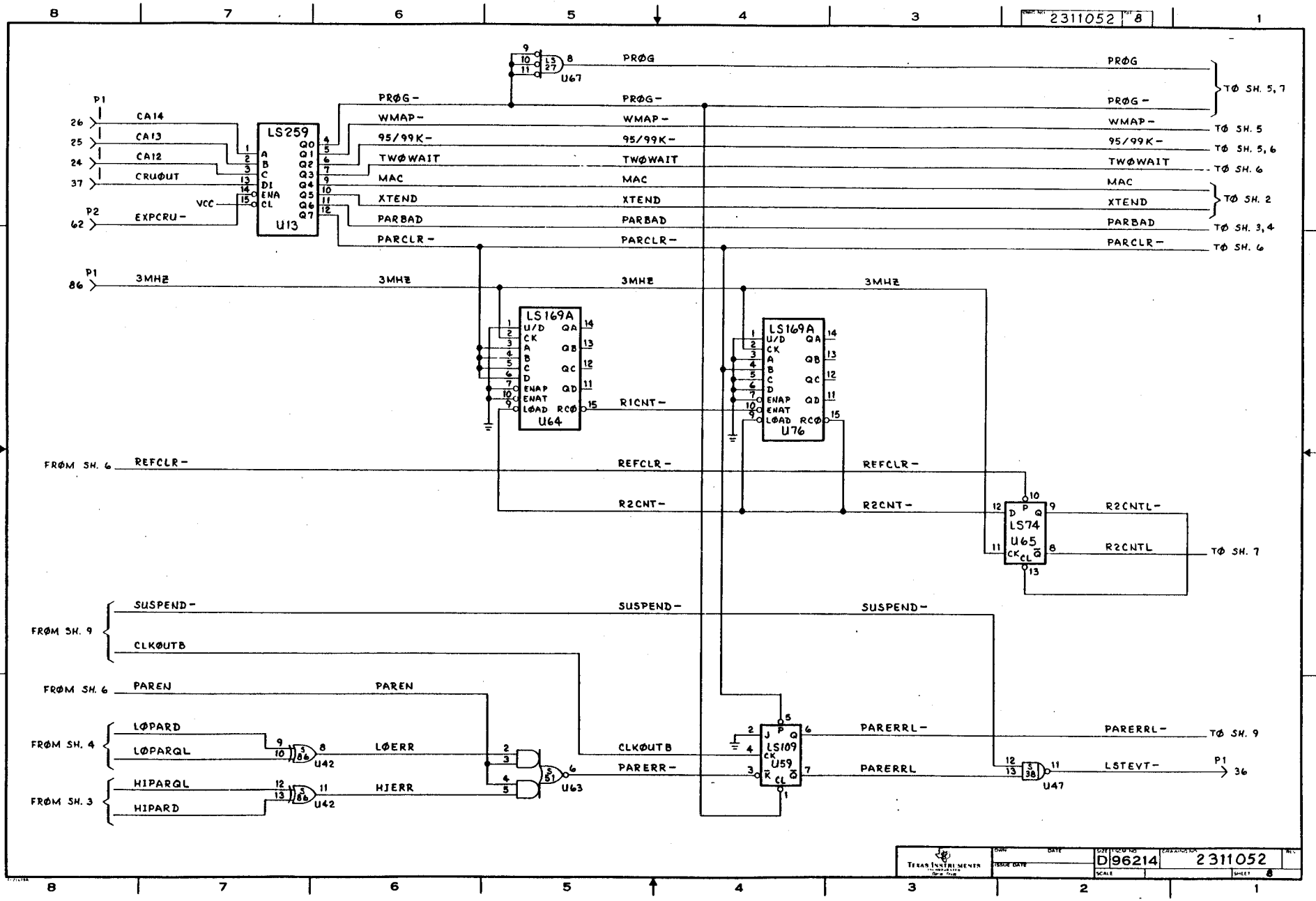
2311052


2311052 8
U67
LS259
U13
P1
CA14
CA13
CA12
CRUOUT
P2
EXPCRU-
VCC
PRØG
PRØG-
WMAP-
95/99K-
TWØWAIT
MAC
XTEND
PARBAD
PARCLR-
TØ SH. 5, 7
TØ SH. 5
TØ SH. 5, 6
TØ SH. 6
TØ SH. 2
TØ SH. 3, 4
TØ SH. 6
3MHZ
LS169A
U64
U76
R1CNT-
FROM SH. 6
REFCLR-
R2CNT-
LS74
U65
R2CNTL-
R2CNTL
TØ SH. 7
FROM SH. 9
SUSPEND-
CLKØUTB
PAREN
FROM SH. 4
LØPARD
LØPARQL
LØERR
U42
FROM SH. 3
HIPARQL
HIPARD
HIERR
U63
LS109
U59
PARERRL-
PARERRL
TØ SH. 9
LSTEVT-
P1
36
U47
TEXAS INSTRUMENTS
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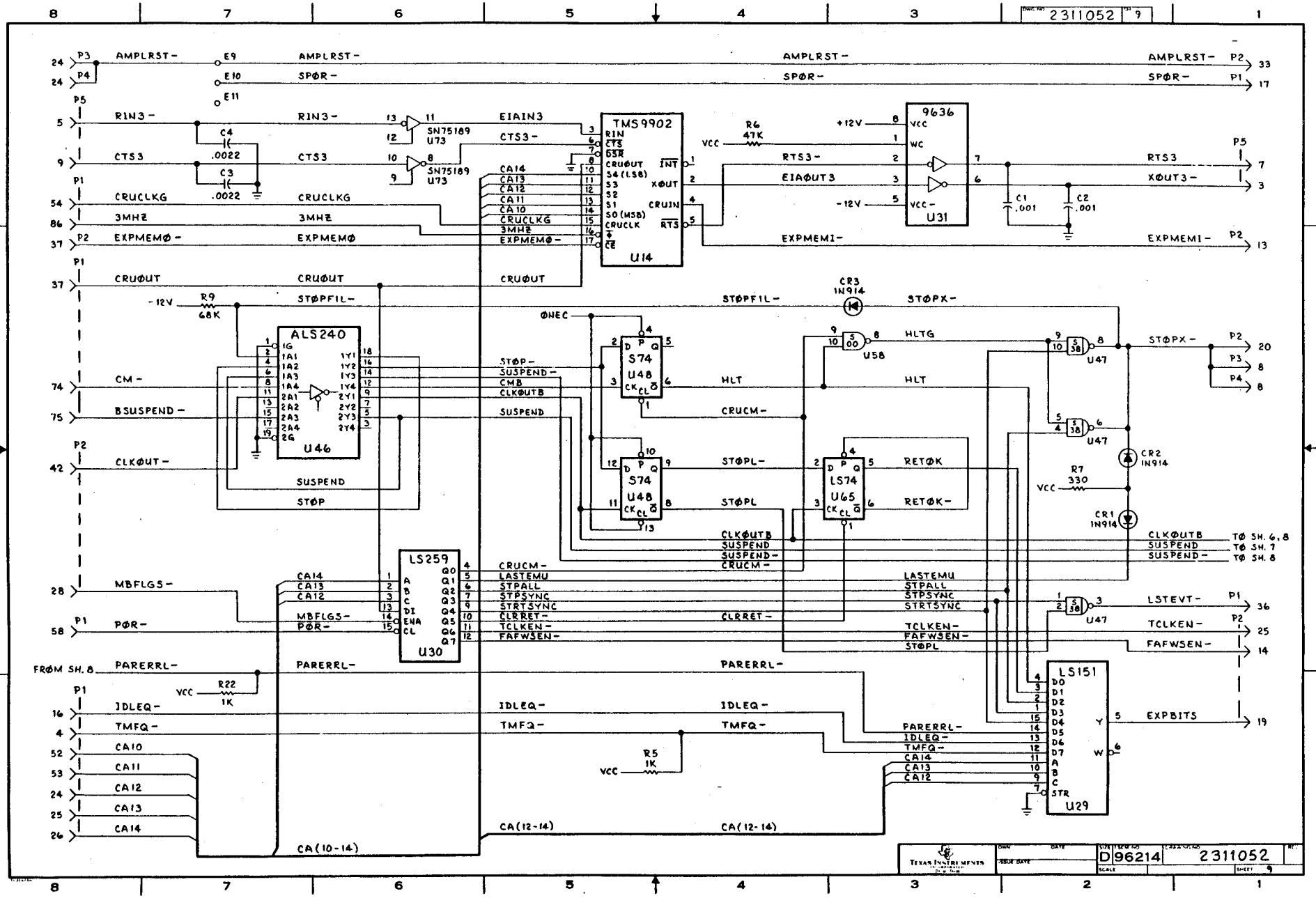
SHEET 8


2311052
AMPLRST-
SPØR-
RIN3-
CTS3
CRUCLKG
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EXPMEMØ-
CRUØUT
CM-
BSUSPEND-
CLKØUT-
MBFLGS-
PØR-
PARERRL-
IDLEQ-
TMFQ-
CA10
CA11
CA12
CA13
CA14
CA(10-14)
CA(12-14)
TMS9902
U14
SN75189
U73
9636
U31
ALS240
U46
S74
U48
LS74
U65
S00
U58
S38
U47
LS259
U30
LS151
U29
R4 47K
R5 1K
R6 47K
R7 330
R9 68K
R22 1K
C1 .001
C2 .001
C3 .0022
C4 .0022
CR1 IN914
CR2 IN914
CR3 IN914
+12V
-12V
VCC
ØNEC
STØPFIL-
STØPX-
STØP-
SUSPEND-
CMB
CLKØUTB
SUSPEND
HLTG
HLT
CRUCM-
STØPL-
STØPL
RETØK
RETØK-
LASTEMU
STPALL
STPSYNC
STRTSYNC
CLRRET-
TCLKEN-
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EXPMEMØ-
EXPMEMI-
RTS3-
EIAØUT3
RTS3
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FROM SH. 8
TØ SH. 6, 8
TØ SH. 7
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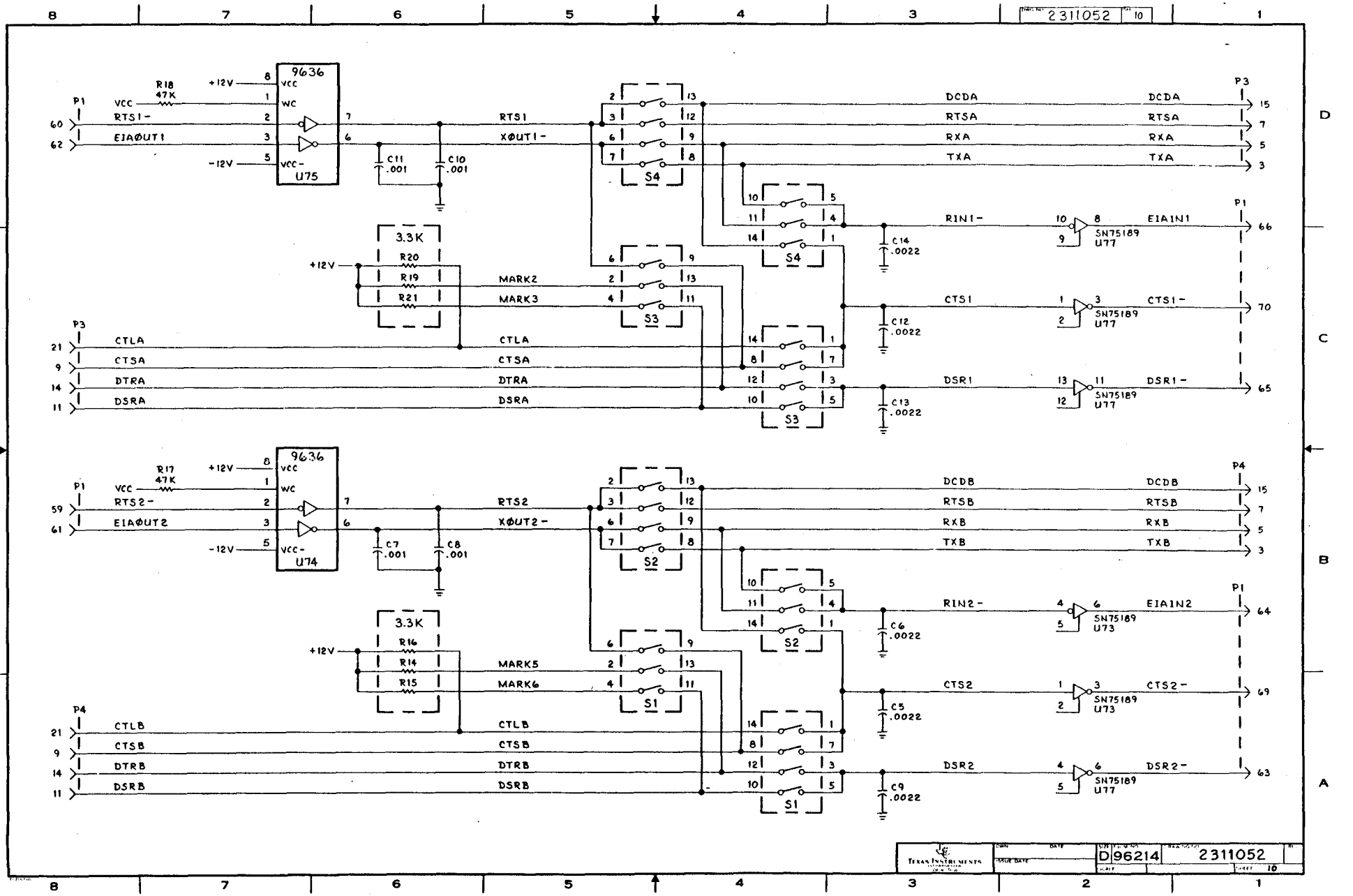
D 96214
2311052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C11 .001
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RTS2
XOUT2-
3.3K
R20
R19
R21
R16
R14
R15
MARK2
MARK3
MARK5
MARK6
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S3
S2
S1
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P3
P4
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CTLB
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TXA
DCDB
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RXB
TXB
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CTS1
DSR1
RIN2-
CTS2
DSR2
C14 .0022
C12 .0022
C13 .0022
C6 .0022
C5 .0022
C9 .0022
SN75189
U77
U73
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TEXAS INSTRUMENTS
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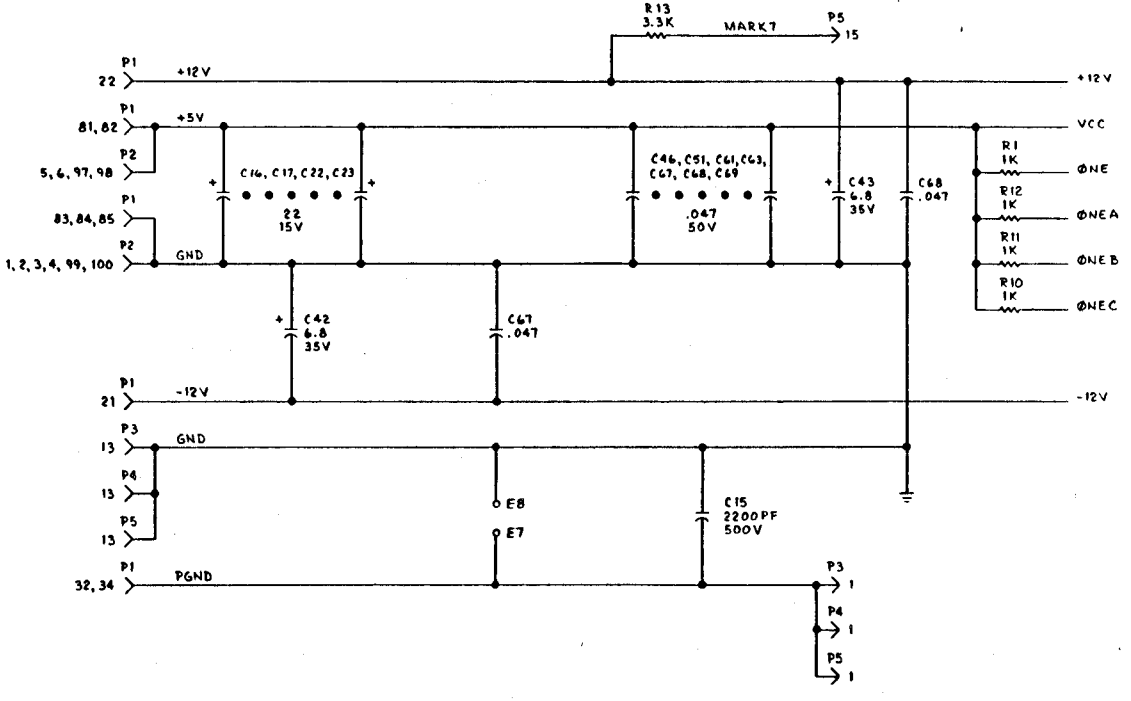
SHEET 10



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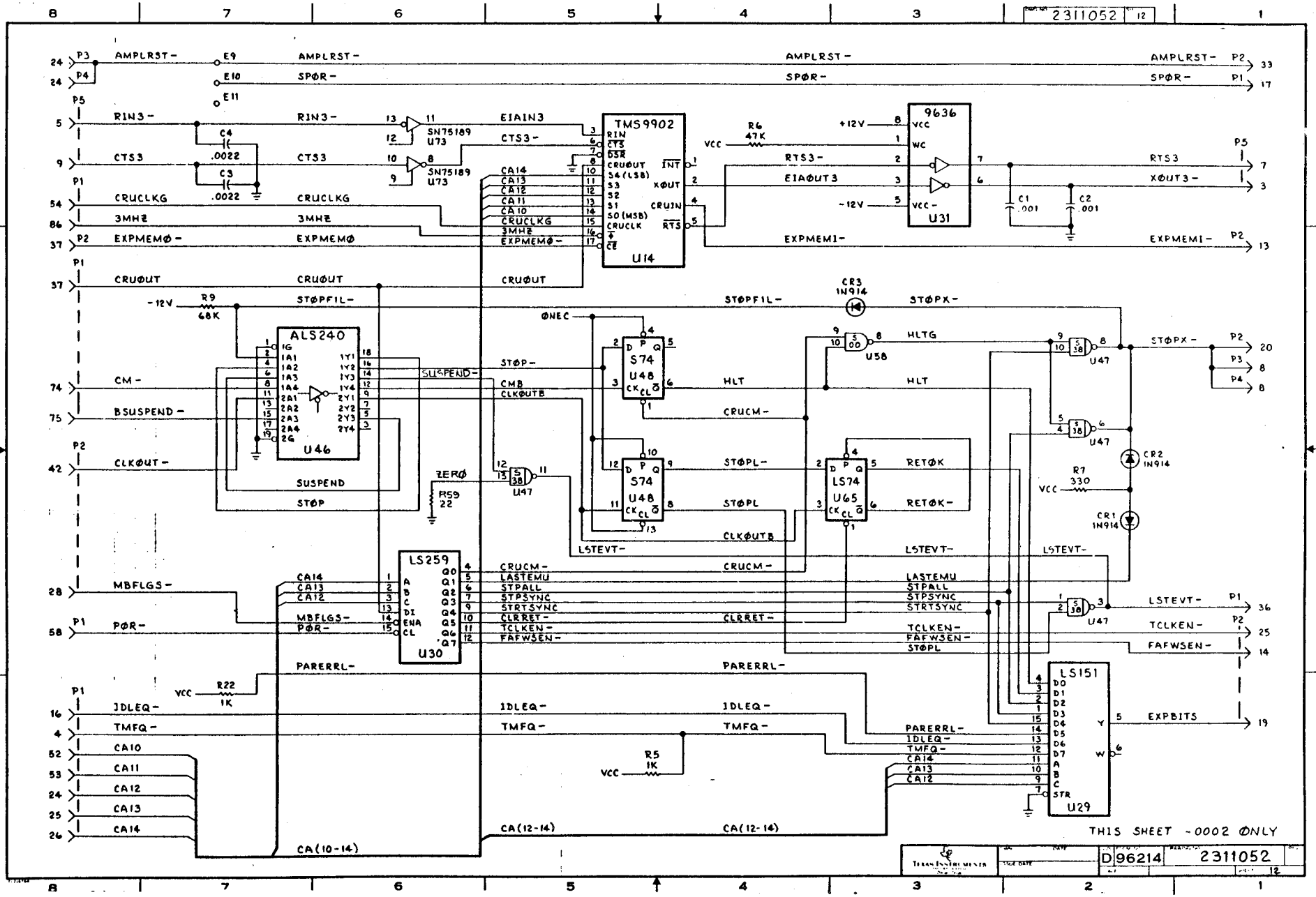
	ISSUE DATE		SCALE SHEET 11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BSUSPEND-
CLKØUT-
MBFLGS-
PØR-
1DLEQ-
TMFQ-
CA10
CA11
CA12
CA13
CA14
PARERRL-
C4 .0022
C3 .0022
SN75189 U73
TMS9902 U14
R6 47K
9636 U31
C1 .001
C2 .001
RTS3-
EIAOUT3
EXPMEM1-
RTS3
XOUT3-
EXPMEM1-
R9 68K
ALS240 U46
SUSPEND-
STØP-
CMB
CLKOUTB
ØNEC
S74 U48
CR3 1N914
STØPX-
HLTG
HLT
CRUCM-
STØPL-
RETØK
RETØK-
LS74 U65
S00 U58
S38 U47
CR2 1N914
R7 330
CR1 1N914
LSTEVT-
LASTEMU
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STPSYNC
STRTSYNC
CLRRET-
TCLKEN-
FAFWSEN-
STØPL
LS259 U30
R59 22
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EXPBITS
CA(10-14)
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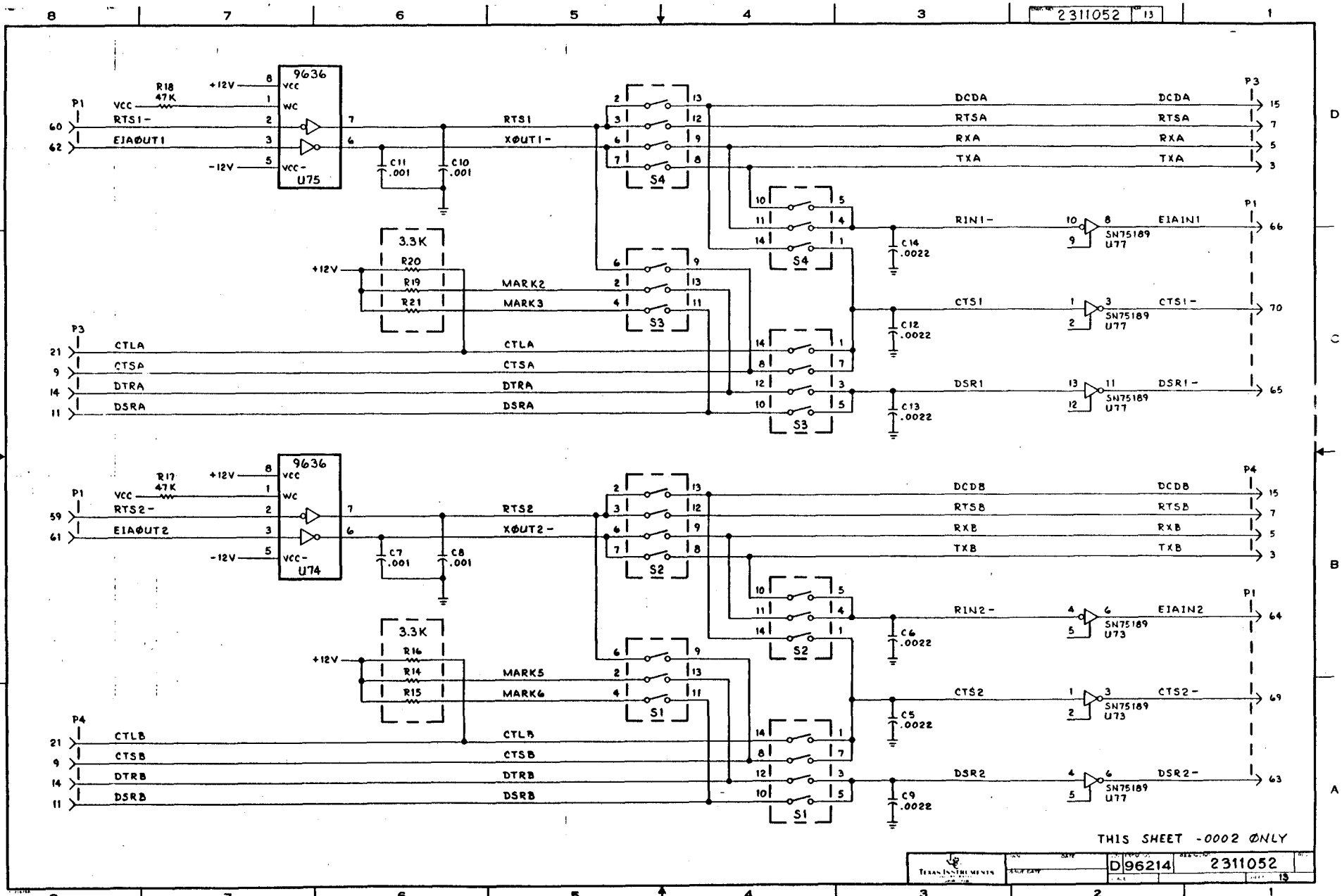
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13
9636
U75
U74
R18
47K
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47K
+12V
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VCC
WC
VCC-
RTS1-
EIAOUT1
RTS2-
EIAOUT2
C11
.001
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C7
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C8
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RTS1
XOUT1-
RTS2
XOUT2-
3.3K
R20
R19
R21
R16
R14
R15
MARK2
MARK3
MARK5
MARK6
S4
S3
S2
S1
P1
P3
P4
CTLA
CTSA
DTRA
DSRA
CTLB
CTSB
DTRB
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SN75189
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U73
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CTS1-
CTS2-
DSR1-
DSR2-
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TEXAS INSTRUMENTS
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A-15