

Service Manual

COMMODORE

AMIGA 500

TECHNICAL MANUAL

microtechtm**roos**
hardware - software - import - export

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Hersteller

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Gerätebezeichnung

Gerätebeschreibung

Best. / Art.-Nr.

Baujahr / Katalog

Ersatzteilversorgung

Baugleich

Lagerort

Interne Daten

A 500

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COMMODORE AMIGA 500

Amiga 500: Erster Heimcomputer mit 16(32) bit-Technologie
und Multitasking

Ton- und Trickfilmstudio eingebaut / Amiga-DOS integriert
Programme selbst

Der Amiga 500 hat schon in der Grundausstattung eine Speicherkapazität von insgesamt 0,75 MB (0,5 MB Arbeitsspeicher/256 KB Betriebssystem) und kann mit einer Steckkarte einfach um 512 KB erweitert werden. Ein 3,5 Zoll Mikrodiskettenlaufwerk mit formatierter Kapazität von 880 KB ist zusammen mit einer großzügigen Volltastatur in einem Gehäuse integriert. Anstelle des Amiga-Farbmonitors kann über einen zusätzlichen PAL-Coder auch ein Farbfernseher angeschlossen werden. Der Amiga 500 arbeitet mit einer 68000 CPU, die von drei weiteren eigenständigen Prozessoren für Grafik, internes Datenmanagement und für Kommunikation unterstützt wird. Mit dem Multitasking-Betriebssystem Amiga-DOS arbeitet er mehrere Programme gleichzeitig ab.

Unverständliche Bedienerkommandos gehören beim Amiga der Vergangenheit an. Alle Computerfunktionen werden mit der Maus gesteuert, indem die gewünschten Funktionen am Bildschirm "angeklickt" werden. Auf Tastendruck lassen sich die Fenster

öffnen, verschieben und schließen, so daß im Computer wie in einem farbigen Bilderbuch geblättert werden kann. Der Amiga unterstützt intuitives Arbeiten. Deshalb nennen die Entwickler diese Bedieneroberfläche "Intuition".

Die schnelle Grafik des Amiga liefert der Spezialprozessor "Denise", ein Bit-Blitter für den schnellen Datentransfer. Er setzt beispielsweise eine Million Bildpunkte pro Sekunde. Er kann außerdem seine Daten aus drei verschiedenen Quellen holen, so daß er auch trickfilmschnelle Sequenzen zeichnen kann. Der Videoprozessor "Agnus" bringt bei einer sehr hohen Auflösung von 640 x 512 Bildpunkten 16 Farben auf den Bildschirm, wobei aus insgesamt 4096 Farbtönen ausgewählt werden kann. Er kann aber auch 4096 Farbtöne gleichzeitig darstellen, wenn man eine geringere Auflösung wählt. Um die interne Steuerung des Datenflusses braucht sich die 68000 16(32) bit - CPU auch nicht zu kümmern. Das macht "Paula", ein Spezialprozessor für Schnittstellenverwaltung und Zugriffsorganisation.

Paula steuert auch Audio Ein- und Ausgabe und nimmt es dabei mit hochwertigen Stereoanlagen und Synthesizern auf: Vier Tonkanäle für zwei Stereo-Ausgänge können voll synthesizermäßig angesteuert werden. Die Digital/Analog - Wandler zur Wiedergabe über die Stereoanlage sind im Amiga bereits eingebaut. Ähnlich wie bei der Videoschnittstelle, über die von einem Videorekorder oder einer Filmkamera Bilder in den Amiga eingelesen werden können, ist auch ein Mikrofonanschluß (Audio-in) vorhanden. Über ein Spezialinterface können Naturstimmen und Musik durch ein Mikrofon vom Amiga aufgenommen und in originalgetreuer, aber auch in beliebig veränderter Form gespeichert und wiedergegeben werden.

Es gibt drei Gründe, die den Amiga zum idealen Lerncomputer machen. Einer ist, daß der Amiga durch Bilder und Filme lehren kann. Er kann auch sprechen. Er tut das in Wechselwirkung mit dem Lernenden. Es gibt derzeit kein anderes Gerät, das derartig viele Möglichkeiten im Unterricht bietet. Das gilt auch in hohem Maße für das Lernen zuhause. Ein anderer Grund

ist, daß die Computertechnik, mit deren Hilfe gelernt wird, so aktuell und modern ist, daß sie von Bürosystemen erst im Laufe der nächsten Generation erreicht (und dann auch entsprechend teuer) wird. Wer mit dem Amiga arbeitet, beherrscht das Computerprinzip von Multitasking und integrierter Kommunikation, das für Jahre hinaus der Standard in der Computertechnik sein wird. Zum dritten ist der Einstieg äußerst leicht. Wie die Maus den Handbewegungen, so folgen die Aktionen des Computers den Gedanken. Selbst kleine Kinder oder ihre Großeltern erlernen den Umgang mit dem Amiga im Handumdrehen.

Höchste Integration und modernste Fertigungstechnik kommen der Zuverlässigkeit und Lebensdauer, aber auch dem Preis zugute. Der Amiga 500 ist komplett mit Schnittstellen ausgestattet. Zwei neunpolige Normstecker nehmen die Anschlüsse für Maus und Joystick auf, zwei Audiobuchsen führen die beiden Stereokanäle nach außen, ebenso ist ein monochromer Video-Anschluß (Cynch-Buchse) vorhanden. Ein Anschluß für ein externes Laufwerk fehlt ebensowenig wie parallele Druckerschnittstelle und serielle Schnittstelle für die Datenkommunikation. Alle Schnittstellen beim Amiga 500 entsprechen den geltenden Normen, so daß keine Spezialkabel für die Peripherie angeschafft werden müssen.

Datenübersicht AMIGA 500

Prozessoren/Controller

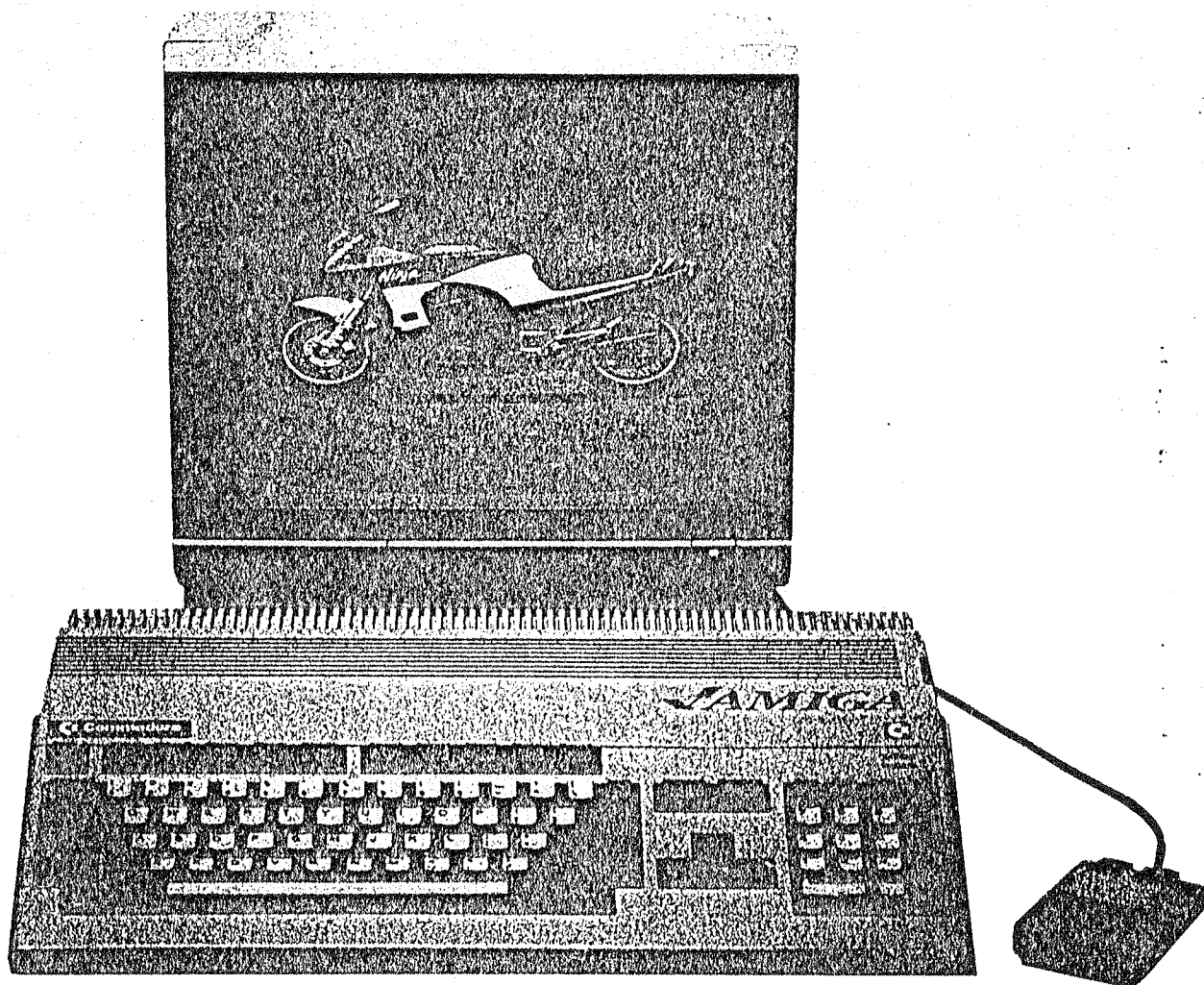
CPU: Motorola 68000, 16/32 bit

Taktfrequenz: 7,14 Mhz

Co-Prozessoren: 3 Co-Prozessoren für DMA, Video, Graphik und Sound

Grafik- und Zeichentrick-Chip "Agnus" Bit-Blitter
- Hochgeschwindigkeits-Datentransfer mit Verknüpfung von Daten aus drei verschiedenen Quellen für die Bewegung von Objekten

- schnelles Linien-Zeichnen und Flächen-Füllen mit 1 Mio Punkte pro Sekunde, baut 60 Bilder pro Sekunde auf



Amiga 500 mit Maus und externem Farbmonitor.

- erkennt Kollisionen zwischen zwei bewegten Objekten

Copper/Coprozessor

- ist mit Bildschirm synchronisiert, wird von Rasterstrahl gesteuert

- versorgt die Register von Agnus, Paula und Denise

- kontrolliert 25 DMA-Kanäle

Video Chip "Denise":

Graphik-Modus:

- 320 x 256
- 320 x 512
- 640 x 256
- 640 x 512

Farben

- 32 bei 320 Spalten
- 16 bei 640 Spalten aus 4096 Farbtönen
- bis zu 4096 Farbtöne je nach Betriebsart gleichzeitig darstellbar

Text-Modus:

- wahlweise 60 oder 80 Zeichen breit, zu 25 Zeilen in Farbe

Sprite-Controller/8

- faßt auf Wunsch zwei Sprites zusammen
- Kollisionsdetektor mit Prioritätenfestlegung bei Überschneidung

Video-Display:

625 Zeilen vertikal, Frequenz 50 Hz
Videospeicher max. 512 kB

Port-Chip "Paula": DMA-Steuerung

- steuert den RAM-Zugriff aller berechtigten Bausteine

I/O-Steuerung

- serielle Schnittstelle
- parallele Schnittstelle
- Control-Ports
- Tastatur
- Audio-Ausgabe
 - 4 Tonkanäle für zwei Stereoausgänge
 - programmierbare Amplitude und Sampling-Rate
 - 9 Oktaven
 - komplexe Wellenform
 - Amplituden- und Frequenzmodulation
- Audio-Eingabe
 - Steuerung eingelesener Naturstimmen oder von Musik-Originalen (über Spezialinterface)

Speicher

Speicherkapazität: 0,75 MB
(insgesamt)

- 0,5 MB RAM
- 256 KB ROM für Kickstart 1.2
- Arbeitsspeicher intern um 512 KB erweiterbar

Massenspeicher: integriert

- 1 x 3 1/2 Zoll Mikro Floppy-Disk
- 880 KB formatiert

extern

- 3 1/2 Zoll Mikro Floppy Disk

Eingabelemente

Tastatur

- prozessorgesteuert
- 96 Tasten
- separater Rechenblock
- separate Cursor-Tasten
- 10 Funktionstasten
- Tastatur integriert
- Help-Tasten

Maus

- zwei Bedienungsknöpfe
- optomechanisch

Audio-Eingabe

- über HiFi-Geräte, Videorecorder, CD-Player
- Mikrofon/Verstärker
- Musikinstrumente mit Midi-Interface

Video-Eingabe

- mit Genlock-Interface / Synchronisation von Computer mit Videoquellen und Darstellung als hintere Bildebene auf Monitor
- über Videokamera
- Bildplatte
- Fernseher
- Bildschirmtext
- Scanner
- Bildbe- und verarbeitung über Videodigitizer

Schnittstellen

Seriell: Programmierbarer Port

- Baudraten bis 31.250
- RS 232 C
- Midi über Adapterstecker

Parallel: Programmierbarer Port

- für Ein- und Ausgabe
- normalerweise als Centronics konfiguriert

Parallel: Programmierbarer Port
- für Ein- und Ausgabe
- normalerweise als Centronics
konfiguriert

Controller-Ports: 2 Ports
- Maus
- Grafiktablett
- Lightpen
- Steuerknüppel
- Drehregler

Video/Audio: 2 Ports
- Cynch Stereo/Audio
- RGB analog, digital

Tastatur: 1 Port

System-
Steckplätze: 1 Steckplatz für RAM-Erweiterung

Composite-
Video: über externen PAL-Coder

Ausgabemedien

Monitor/TV: Color-Monitor über RGB-Anschluß, TV-Anschluß
über externen PAL-Coder

Sprach/Sound-
ausgabe: Eingebauter Lautsprecher oder über
externe Tonquellen, 4 unabhängige
Soundkanäle als 2 Stereokanäle konfiguriert

Datenfernüber-
tragung: Übertragung von digitalisierten In-
formationen aus Texten, Grafiken,
Bildern, Sprache und Musik je nach
Datenleitung

Netzteil: 220 Volt, 50 Hz

AMIGA
SYSTEM - SOFTWARE

Irgendwo zwischen "mir" und den Chips!

- System-Software: Verbindung zwischen Mensch und Maschine
- Starten des Systems: Kickstart oder Workbench - oder beide
- Die System-Software macht das Multitasking
- Amiga -DOS ist offen für alle Erweiterungen

Irgendwo zwischen "mir" und den Chips!

Bei dem Versuch, die Position von System-Software in einem Gesamtsystem zu beschreiben, tappt man gedanklich irgendwo in den - je nach Standort - geheimnisvollen oder interessanten Tiefen eines Computers. Jedermann ahnt, daß diese Art von Software benötigt wird, um die einzelnen Bits der Hardwareregister zu steuern. Auch kann das, was sich als Bildschirmmeldung zeigt, nicht zufällig in das System implementiert worden sein.

An dieser Stelle ist man gar nicht mehr so weit von der eigentlichen Intention und Aufgabe von System-Software entfernt. Sie ist das Medium, mit dem ein großer Teil der Idee und Philosophie des Gesamtsystems Amiga zum Anwender transportiert wird, auch wenn sie hauptsächlich die Bits und Bytes im System hin- und herschaufelt. So ist es die System-Software, die die Ideen in Aktionen umsetzt, ohne den Benutzer selbst damit zu belasten, wie er seine Ideen dem Computer am besten mitteilt. Er soll intuitiv mit dem System umgehen und es für sich einsetzen lernen.

System-Software: Verbindung zwischen Mensch und Maschine

Als Verbindung zum Benutzer stehen vom Amiga Tastatur und Maus als Eingabe- und primär der Monitor als Ausgabe-Medium zur Verfügung. An dieser Stelle tritt die System-Software als Vermittler auf den Plan und offeriert damit dem Anwender eine der Stärken des schon vorgestellten Amiga-Konzepts: Die Bildschirmausgabe ist so gestaltet, daß der Benutzer seine eingegebenen Aktionen direkt verfolgen und kontrollieren kann. WYSIWYG! (What-you-see-is-what-you-get!). Zu den weiteren Merkmalen von bedienerfreundlichen Computersystemen gehören zweifelsohne:

- Leichtes Kennenlernen des Systems durch Probieren (Anklicken von Icon's)
- Einfaches (Wieder-)Erkennen von Zusammenhängen im System (Fenstertechnik)
- Bekannte Strukturen (DOS-Befehle)
- Unterstützung intuitiven Handelns.

Der Benutzer soll eine ganz leichte Kontrolle über das System haben. Er bekommt deshalb immer eine Situationsmeldung vom System:

- Aktionen fordern Bestätigung = OK
- Ausweg vorhanden = CANCEL
- Aktionen geben Feedback = WAIT

Starten des Systems: Kickstart oder Workbench - oder beide

Um diese Features in das System Amiga zu integrieren, wurde unter der freundlichen Oberfläche eine leistungsfähige System-Software implementiert, die die komplexe Hardware des Amiga steuert und kontrolliert. Ein wesentlicher Teil dieser Software wird bereits mit dem Einschalten des Amiga aktiviert: Der im ROM implementierte KICKSTART in der neuesten Version 1.2.

Was ist nun eigentlich dieser "Kickstart"?

Er enthält die wesentlichen Teile der Software, die z.B. im altbekannten PC im BIOS (als ROM) und im speicherresidenten Teil des DOS (wird beim Booten von der Floppy oder der Harddisk geladen) zu finden sind. Um die in dieser Maschine steckenden Ideen zu begreifen, müssen wir ein wenig tiefer in das komplexe Software-System zwischen Benutzer und der eigentlichen Hardware eindringen.

Im Folgenden sind die wesentlichen Software-Elemente des Kickstarts mit ihren wichtigsten Aufgaben angeführt:

- EXEC:

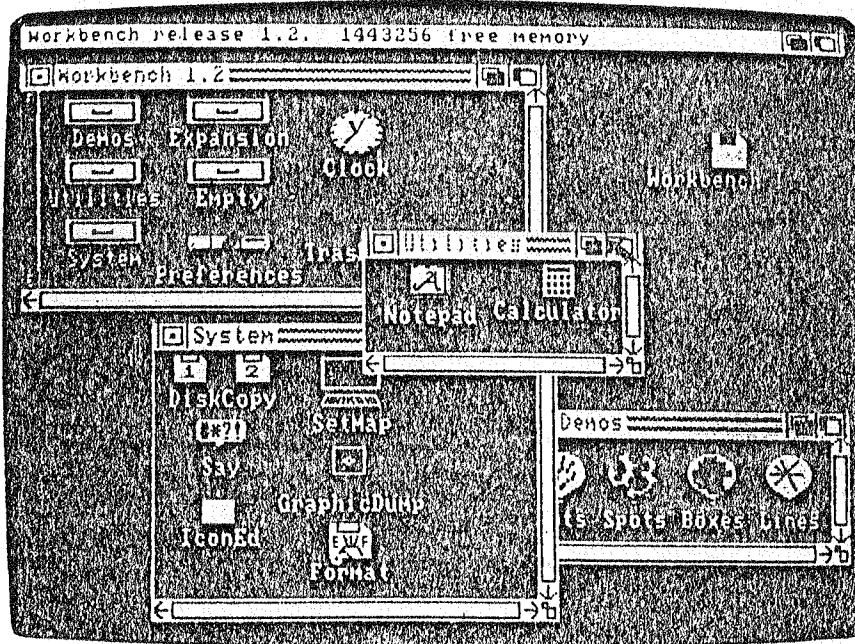
Hardwarenächster allgemeiner Teil der System-Software

- kontrolliert den 68000 Prozessor des Amiga
- teilt den verschiedenen TASKS ihrer Priorität entsprechende Zeitscheiben der Prozessorzeit zu und ordnet diese Tasks in Warteschlangen (Multitasking)
- verwaltet die System INTERRUPTS
- kommuniziert über MESSAGES mit anderen Prozessen.

- Amiga-DOS:

Verwaltet das File System des Amiga

- Steuerung von Stapel-Jobs, Batch Verarbeitung
- startet, unterbricht und informiert über Prozesse im System
- Command-Line-Interpreter (CLI) schafft eine PC-ähnliche Umgebung - prompt, zeilenorientiert
- Beinhaltet Kommandos und Utilities zur Steuerung des Systems.



Amiga Workbench 1.2 als mausgesteuerte Benutzeroberfläche.

- DEVICES:

Spezielle Treiber für die verschiedenen Baugruppen der Hardware. Schnittstellen zwischen der multitaskingfähigen Software und der singletaskingfähigen Hardware

Beispiel: Zwei Prozesse wollen auf die Floppy zugreifen, die jedoch nur einen Datenstrom zur gleichen Zeit bearbeiten kann. Im Task-Disk Device Treiber werden beide Anforderungen verwaltet und nacheinander bearbeitet.

- Track Disk-Device steuert einen oder mehrere Floppy-Laufwerke
- Keyboard Device nimmt Eingaben von der Tastatur entgegen
- Input Device sammelt und verteilt die Eingaben von Tastatur, Maus und anderen Prozessen
- Console Device konvertiert den Roh-Input des Input Device in ASCII oder entsprechende Formate und bereitet Escape-Sequenzen auf
- Gameport Device koordiniert Maus- und Joystickaktionen
- Audio Device kontrolliert den Audioausgang des Amiga
- Serial und Printer Device kommunizieren mit den entsprechenden Ports des Amiga.

Die Steuerung der Bildschirmausgabe nimmt eine Sonderstellung ein, da sie aus einer Sammlung von Text- und Graphikausgaberoutinen besteht, die von INTUITION zur Ausgabe auf den Monitor benutzt werden.

- INTUITION:

Verantwortlich für alle graphischen Aktionen auf dem Amiga-Monitor. Benutzt Routinen der Graphic- und der Layer-Bibliothek für Ausgaben auf den Bildschirm.

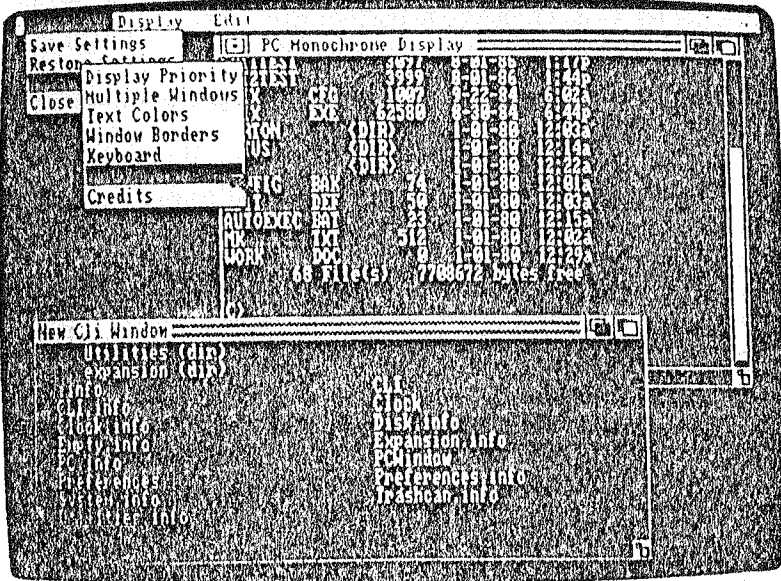
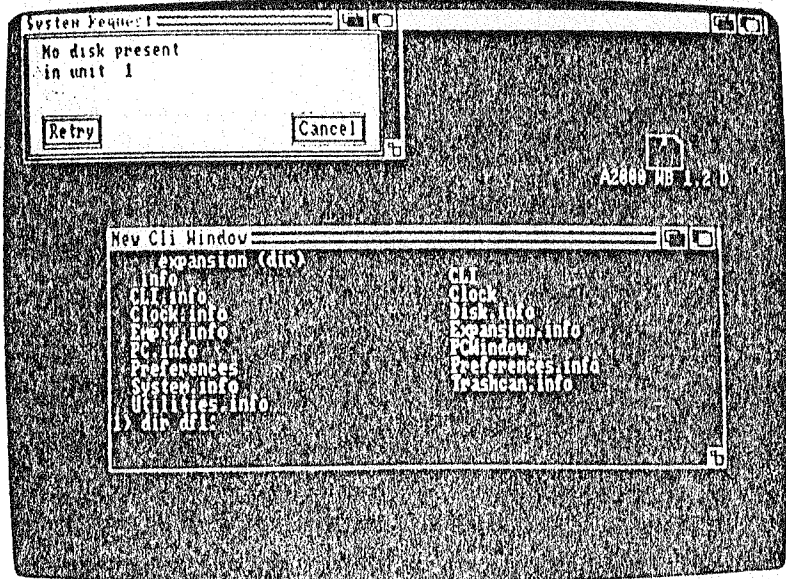
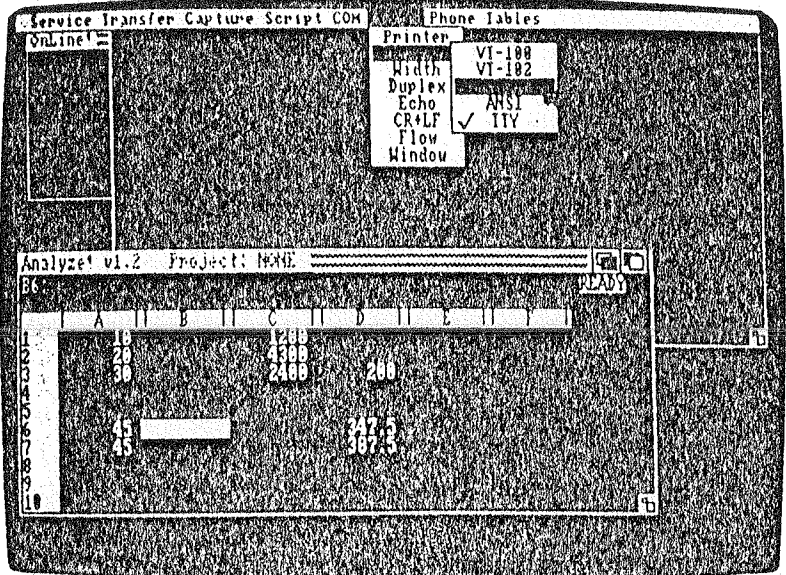
- Öffnen, Schliessen, Verschieben und Aktivieren von WINDOWS und SCREENS als deren Hintergrund
- Steuerung der Pull Down-Menüs
- Kontrolle der GADGETs
- Steuerung der REQUESTER
- Anzeigen von System- oder Programmfehlern durch ALERTs
- Koordination von Signalen im System (EVENTS)

Beispiele für INTUITION zeigen die Abbildungen 22,23 und 24 auf der Seite 49.

Die System-Software macht das Multitasking

Wie gerade erwähnt, laufen alle Aktivitäten der besprochenen Module gleichzeitig im System. Schon bevor ein Benutzer auch nur eine Aktion gestartet hat, arbeiten Tasks im Amiga parallel, miteinander kommunizierend und sich gegenseitig unterstützend; das ist echtes Multitasking!

Die Multitaskingfähigkeit des Amiga ist vom Anwender leichter zu steuern, wenn vorher die Workbench von der Diskette geladen wurde. Jetzt stehen ICONs, DRAWERs und alle besprochenen Features von INTUITION zur Verfügung. Durch "Anklicken" mehrerer Programm-Icons nacheinander werden im Multitasking alle Programme gleichzeitig aktiviert.



Beispiele für Arbeitsweise INTUITION

Amiga-DOS ist offen für alle Erweiterungen

Auf die Workbench- und Applikationsprogramme wird an anderer Stelle eingegangen. Im Folgenden ist die Erweiterung und Ausbaufähigkeit der System-Software anhand einiger Beispiele erläutert.

- KEYMAPS:

Mit der Workbench Diskette stehen dem Anwender zwölf unterschiedliche Tastatur-Tabellen für alle europäischen und nordamerikanischen Länder zur Verfügung. Die System-Software liefert alle Routinen und Utilities (SETMAP), um diese oder weitere Tabellen (Keymaps) für andere Länder oder spezielle Keyboards in den bereits besprochenen Console-Device Treiber einzubinden.

- FONTS:

Der Amiga stellt seinem Benutzer schon mit der WORKBENCH acht verschiedene Zeichensätze in unterschiedlichen Zeichengrößen zur Verfügung, die mit geeigneten Utilities (Font-Editor) verändert oder neu kreiert werden können. Hier zeigt sich der Amiga für jede Art von Textprozessing flexibel und anpassungsfähig.

- DEVICE Treiber:

Ein spezielles Sub-Directory der WORKBENCH enthält alle verfügbaren Device Treiber, um die verschiedenen internen und externen Baugruppen des Amiga in das Software System einzubinden. Die MOUNTLIST beschreibt die logischen Eigenschaften und Formate der aktivierbaren Device Treiber.

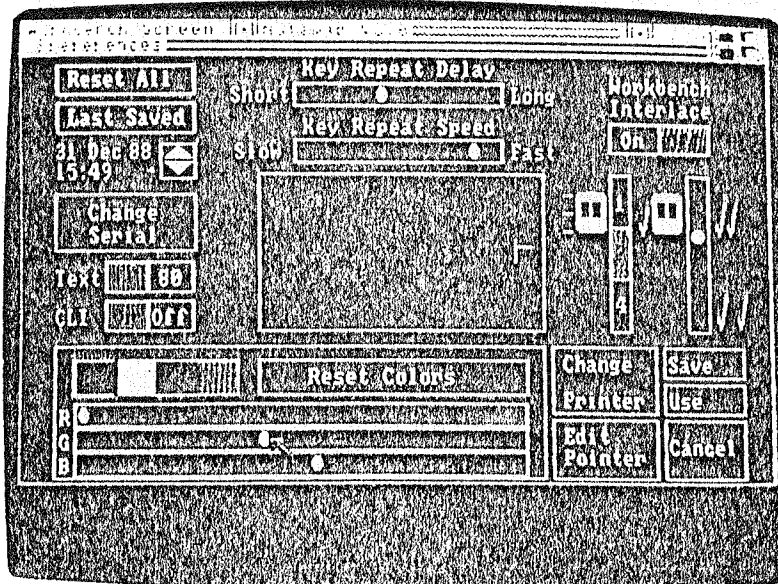
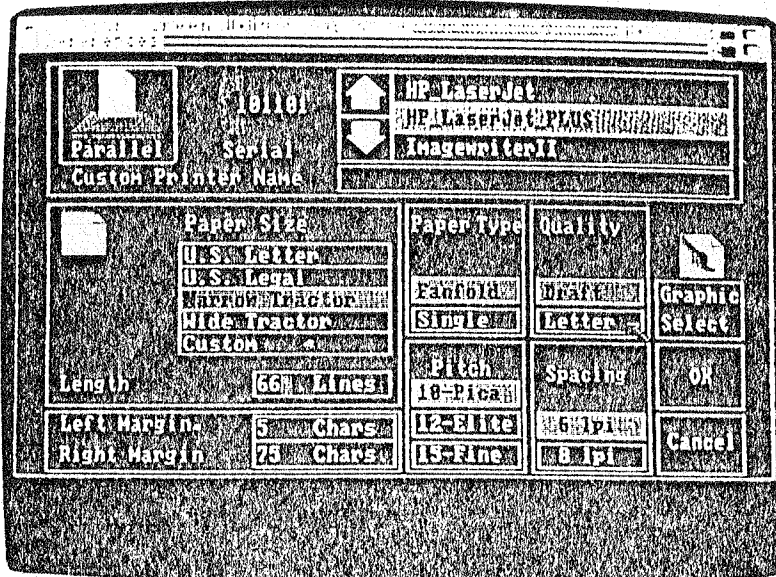
- Printer Treiber:

In den Printer Treibern, einer Untergruppe der beschriebenen Device Treiber, sind die speziellen Eigenschaften der üblichsten Drucker beschrieben. Die WORKBENCH wird mit 16 Druckertreibern ausgeliefert, deren Anzahl laufend zunimmt.

- EXPANSION Library:

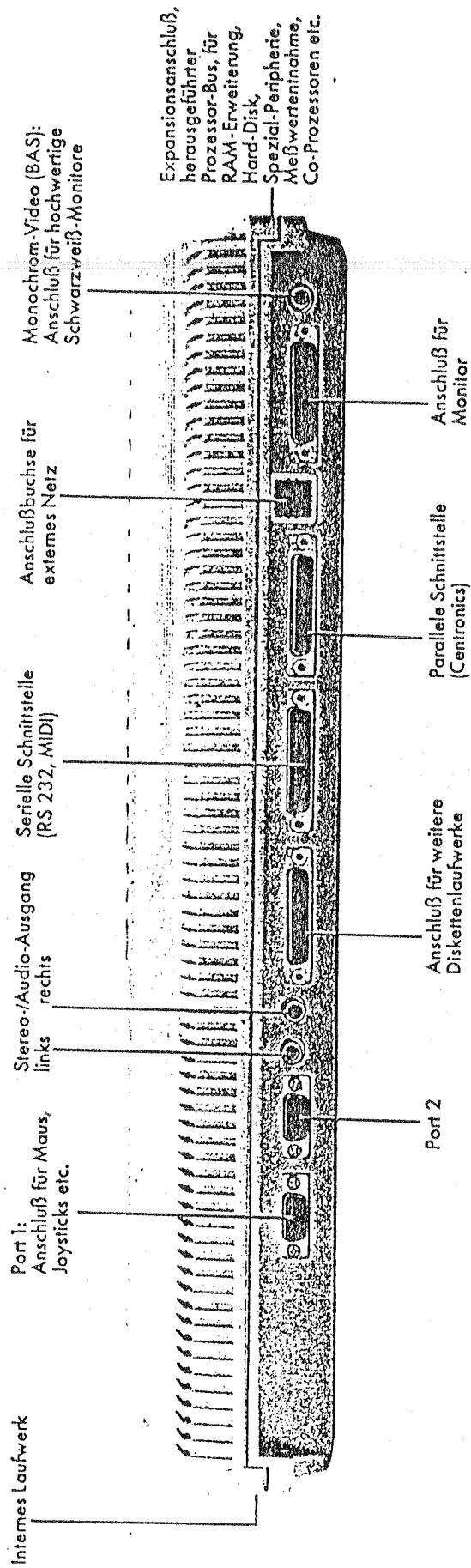
Mit der EXPANSION Library bietet der Amiga die Möglichkeit, die System-Software um weitere System Routinen zu erweitern. Besonders der neue Amiga 2000 nutzt dieses Feature, um die

Erweiterungsboards in den Slots in die Software-Umgebung einzubinden. Jedes neue Board, welches dem System neue Eigenschaften offeriert (PC/XT-Emulator, Harddisk-Controller), kommuniziert mit Hilfe einer Sammlung von System-Routinen mit der System-Software. Diese neuen Routinen werden von der automatischen System-Konfiguration (AUTOCONFIG) in der Expansion Library gefunden und der entsprechenden Hardware in einem der Amiga Erweiterungsslots zugeordnet. Damit wird diese für den Amiga ansprechbar und steht dem System und so dem Anwender zur Verfügung.



Das Amiga-Betriebssystem stellt eine Reihe von wertvollen Tools zur Verfügung, hier Beispiele für Druckeranpassung und Farbmischung.

Amiga Hardware



Eine Vielzahl von Logikfunktionen vereinigt dieser Gate-Array-Chip in sich (Spitzname: Gary)

Ein-/Ausgabe-Baustein (8520)

Paula ist zuständig für Diskettenoperationen, Tonausgabe, Interrupts und den seriellen Port

Ein-/Ausgabe-Baustein (8520)

Die »Fat Agnes«: Blitter, Copper und die DMA-Logik sind in diesem Baustein zusammengefaßt

Denise: dieser Spezialchip kontrolliert Grafik, Sprites und Farben

Kickstart 1.2 im ROM. Das gesamte, 256 KByte große Betriebssystem findet darin Platz.

Alle wichtigen Signalleitungen liegen am Expansionsport

Das Herzstück des Amiga 500: der 68000-Prozessor

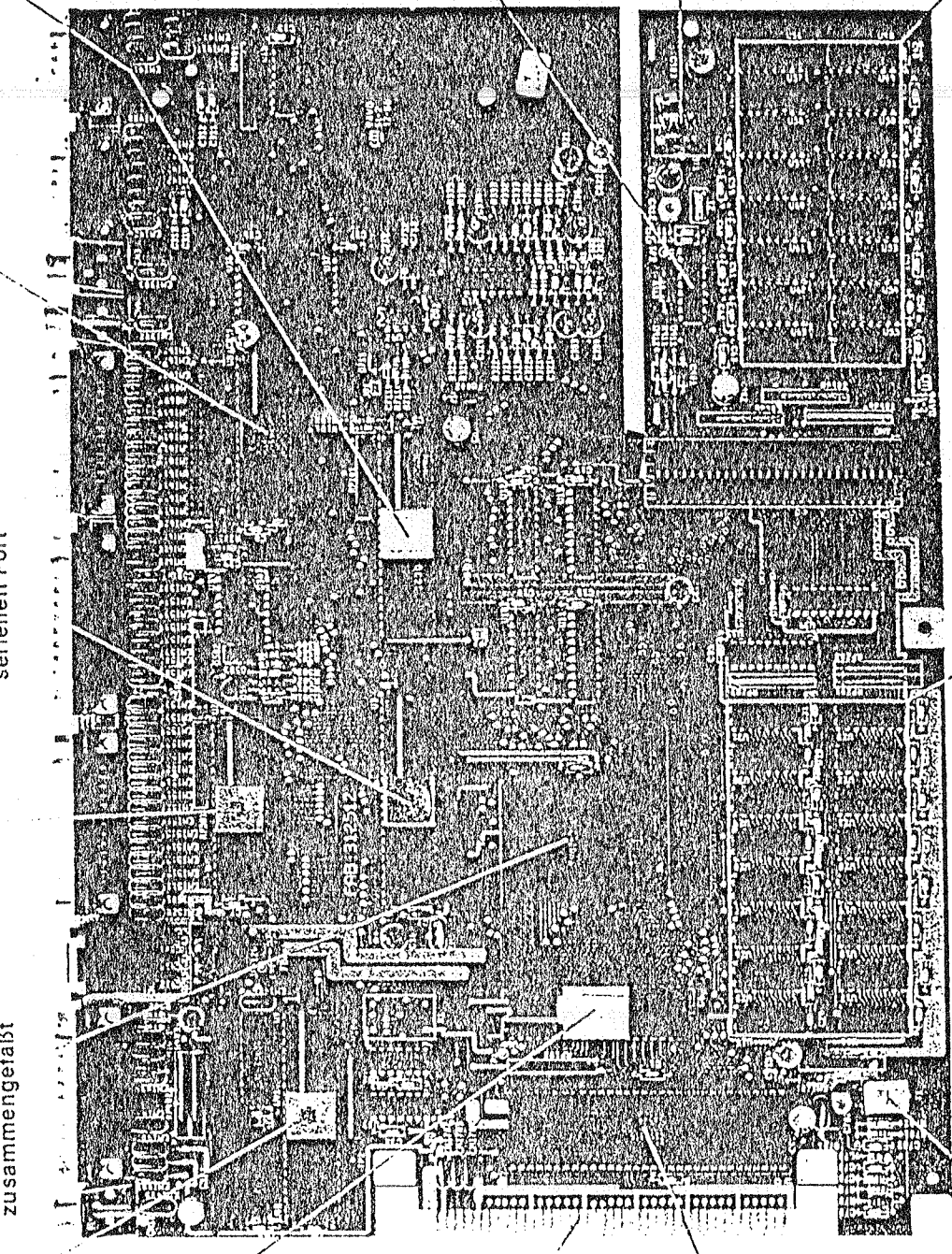
Quarz für Videotakt (28,63 MHz). Durch Teilen dieser Frequenz ergibt sich der Prozessortakt von 7,16 MHz

16 einzelne 256-KBit-RAMs mit einer Zugriffszeit von 150 Nanosekunden ergeben den 512-KByte-RAM-Speicher der Amiga-500-Grundversion

Weitere 512 KByte stellt die einsteckbare Erweiterungskarte zur Verfügung

Der Uhr-/Kalender-Chip macht das Einstellen von Datum und Zeit per Hand überflüssig

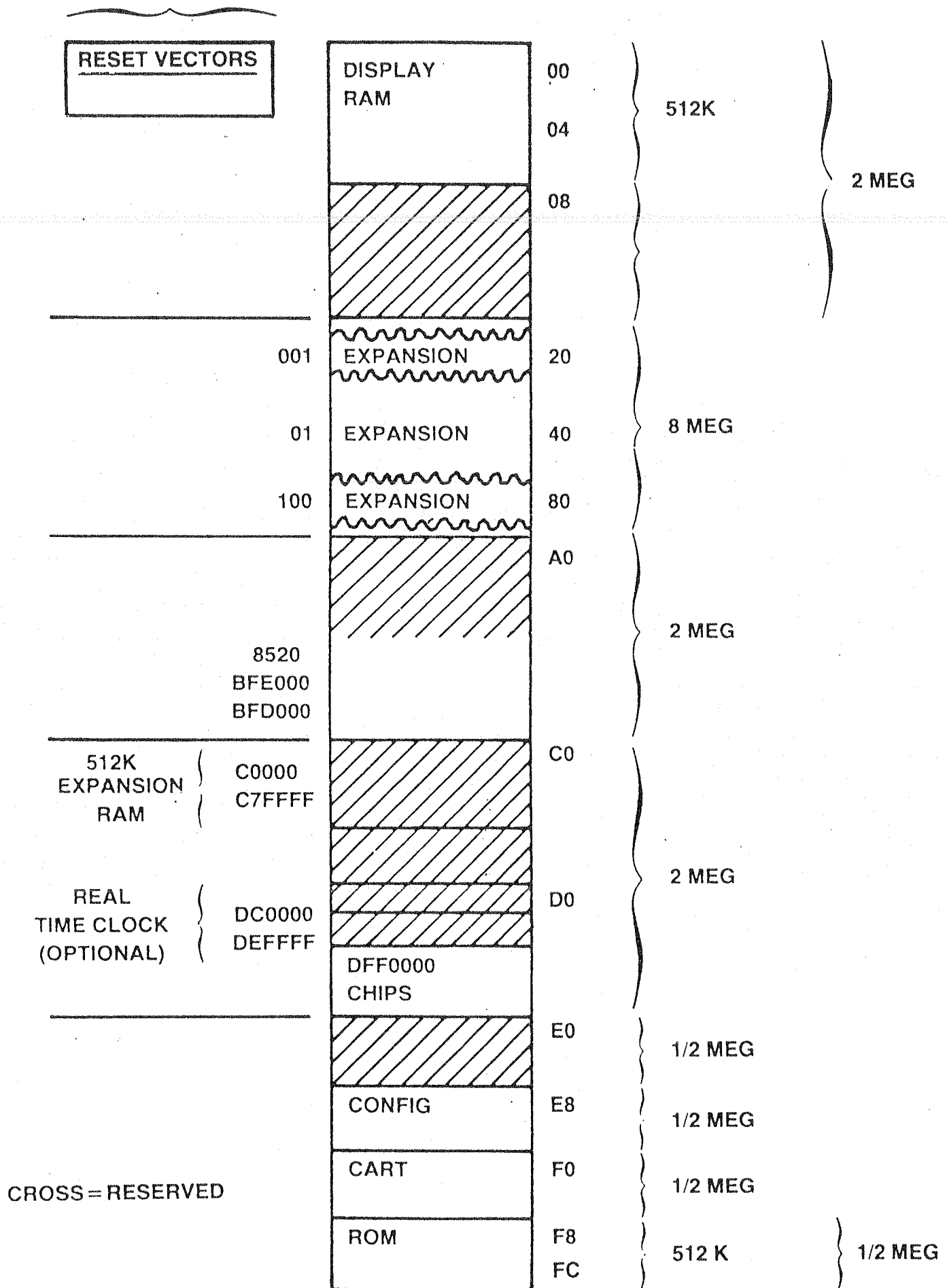
Ein Akku sorgt dafür, daß die Uhr auch bei ausgeschaltetem Computer weiterläuft



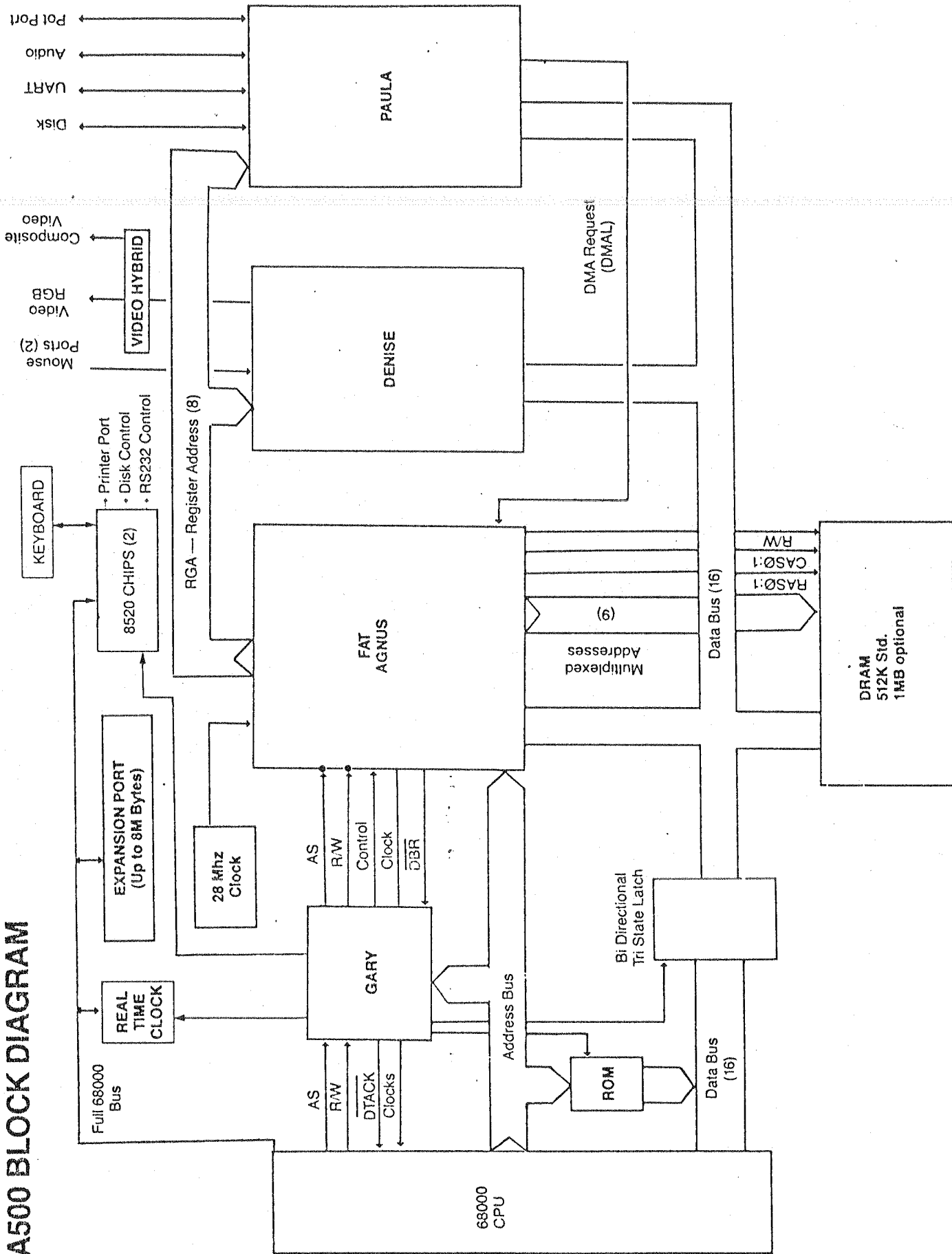
Übersichtlich und sauber aufgebaut — die Hardware des Amiga 500 inklusive der zusätzlichen 512-KByte-RAM-Karte.

Amiga 500 Memory Map

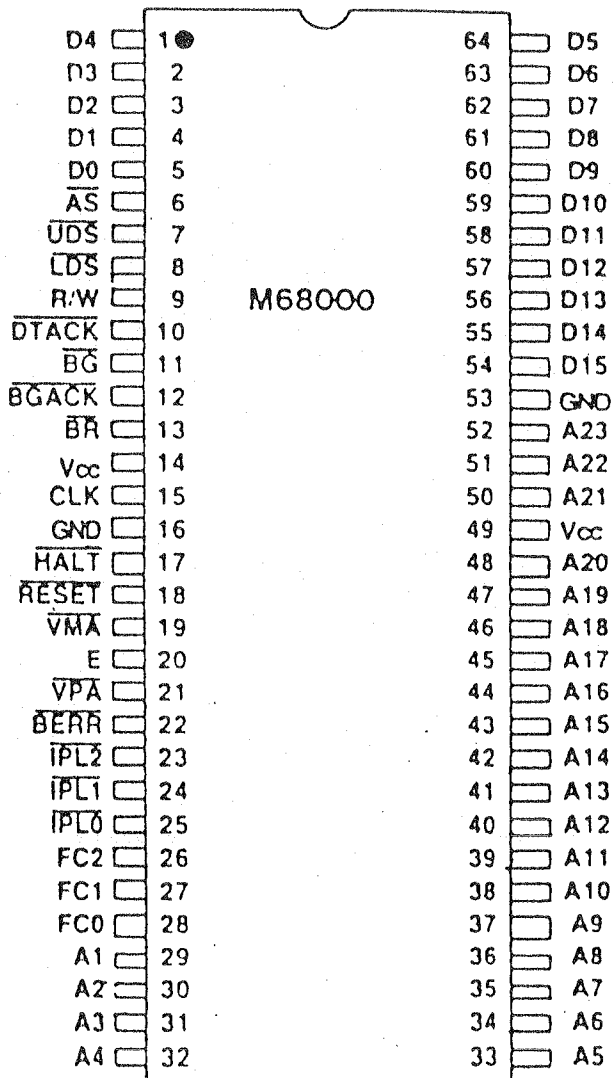
OVERLAY



A500 BLOCK DIAGRAM



— MC 68000 —
U1



Signalbeschreibung MC 68000

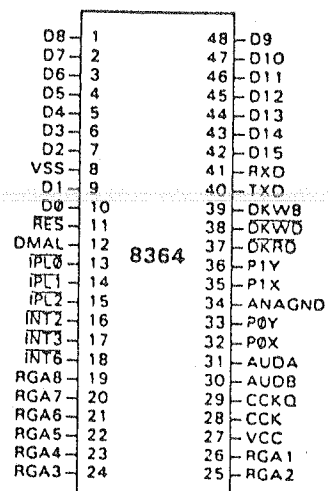
Signalname	Signal- name	Tristate	Funktion
A1-A23	A	ja	Adressleitungen
DO-D15	E/A	ja	Datenleitungen
AS	A	ja	Adress-Strobe
R/W	A	ja	Lesen/Schreiben
UDS, LDS	A	ja	Obere u. untere Daten-Strobes
DTACK	E	nein	Datentransfer-Quittung
BR	E	nein	Busanforderung
BG	A	nein	Buszuteilung
BGACK	E	nein	Buszuteilungs-Quittung
IPL0, IPL1, IPL2	E	nein	Interrupt/Priorität
BERR	E	nein	Busfehler
RESET	E/A	nein*	Rücksetzen
Halt	E/A	nein*	Halt
E	A	nein	Synchrontakt
VMA	A	ja	Gültige Speicheradresse
VPA	E	nein	Gültige Peripherieadresse
FC0, FC1, FC2	A	ja	Function Code
CLK	E	nein	Takt
Vcc	-	-	Speisespannung +5V
GND	-	-	Masse

* open drain

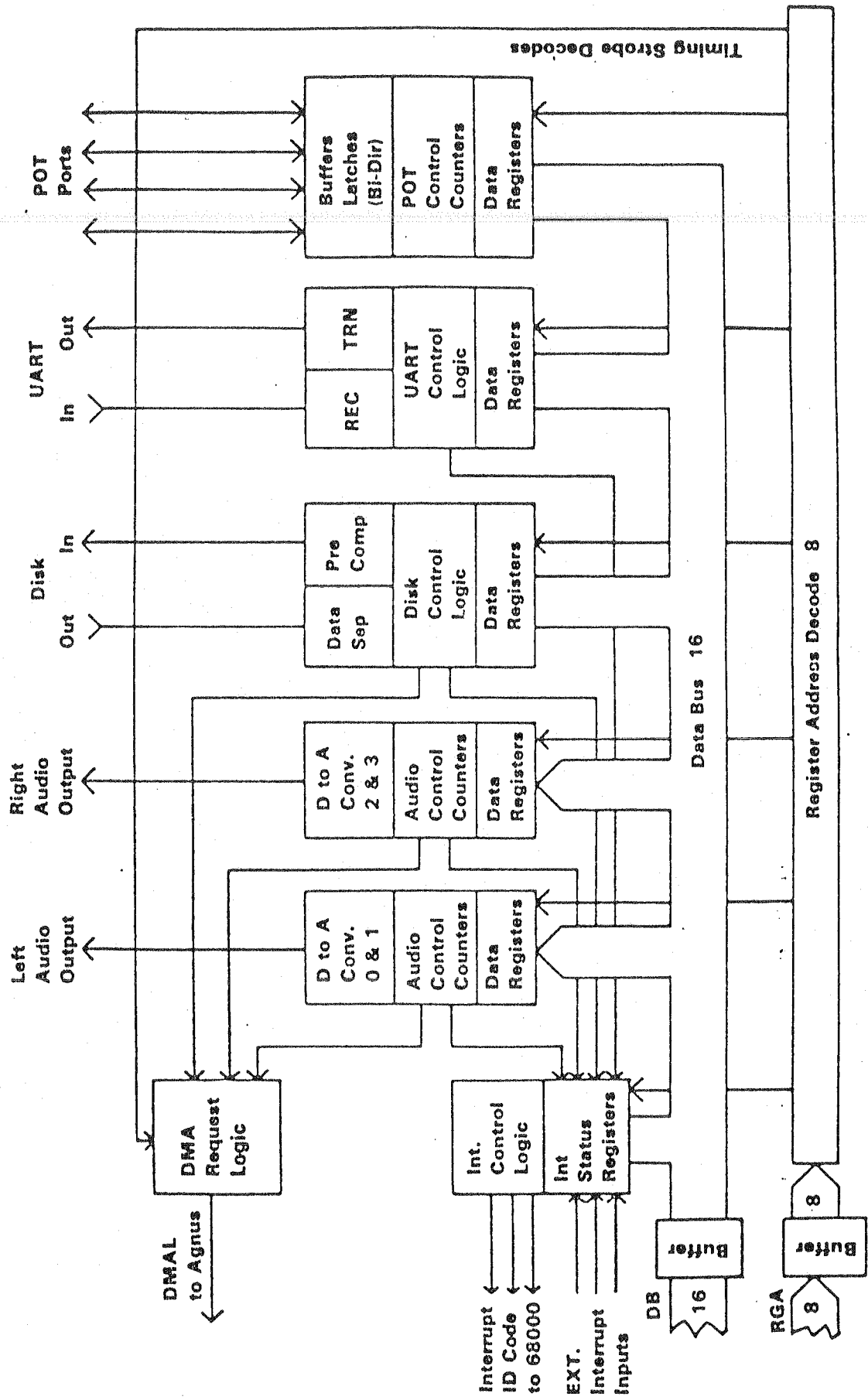
Custom Sound/Peripherals Chip Paula

Features:

- Four voices of sound output configured as two stereo channels
- Nine octaves
- Complex waveforms
- Uses both amplitude and frequency modulation
- I/O controls for disk data and controller ports
- Microdisk controller
- Interrupt control system



Pin	Name	Description	Type
1-7	D2-D8	Data Bus Lines 2-8	I/O
8	Vss	Ground	I
9,10	D0,D1	Data Bus Lines 0,1	I/O
11	/RES	System Reset	I
12	DMAL	DMA Request Line	O
13-15	/IPL0-2	Interrupt Line 0-2	O
16-18	/INT2,3,6	Interrupt Level 2,3,6	I
19-26	RGA1-8	Register Address 1-8	I
27	Vcc	+5 VDC	I
28	CCK	Color Clock	I
29	CCKQ	Color Clock Delay	I
30	AUDB	Right Audio	O
31	AUDA	Left Audio	O
32	POT0X	Pot 0X	I/O
33	POT0Y	Pot 0Y	I/O
34	VSSANA	Analog Ground	I
35	POT1X	Pot 1X	I/O
36	POT1Y	Pot 1Y	I/O
37	/DKRD	Disk Read Data	I
38	/DKWD	Disk Write Data	O
39	DKWE	Disk Write Enable	O
40	TXD	Serial Transmit Data	O
41	RXD	Serial Receive Data	I
42-48	D9-15	Data Bus Lines 9-15	I/O



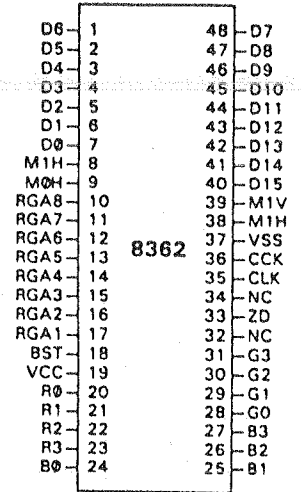
Paula Block Diagram

Custom Graphics Chip

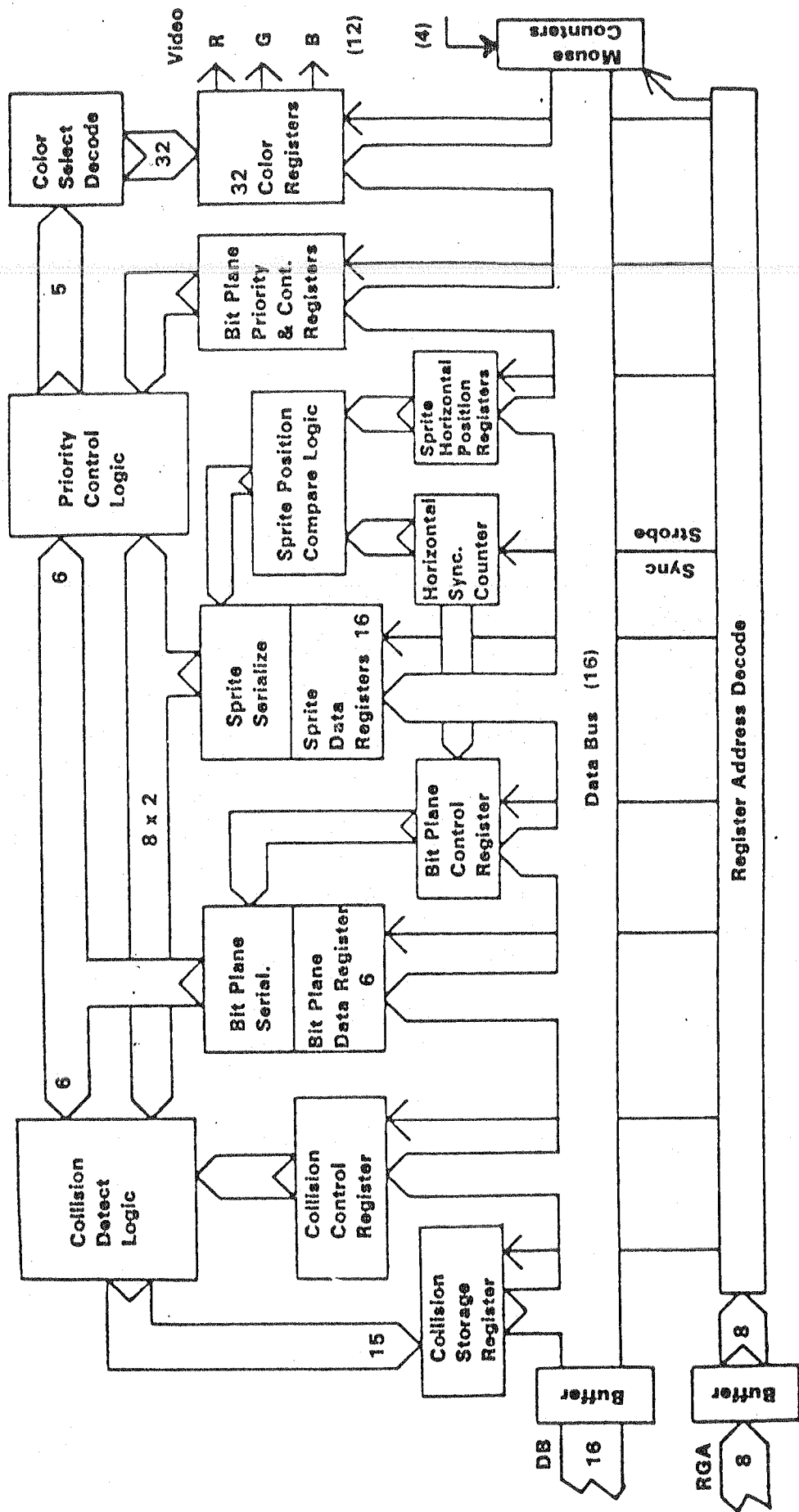
Denise

Features:

- Many different resolutions
320 × 200 up to 640 × 400
- 4096 colors on a TV or RGB monitor
- Eight re-usable sprite controllers
- 60 or 80 column text
- Same software for all TVs and monitors



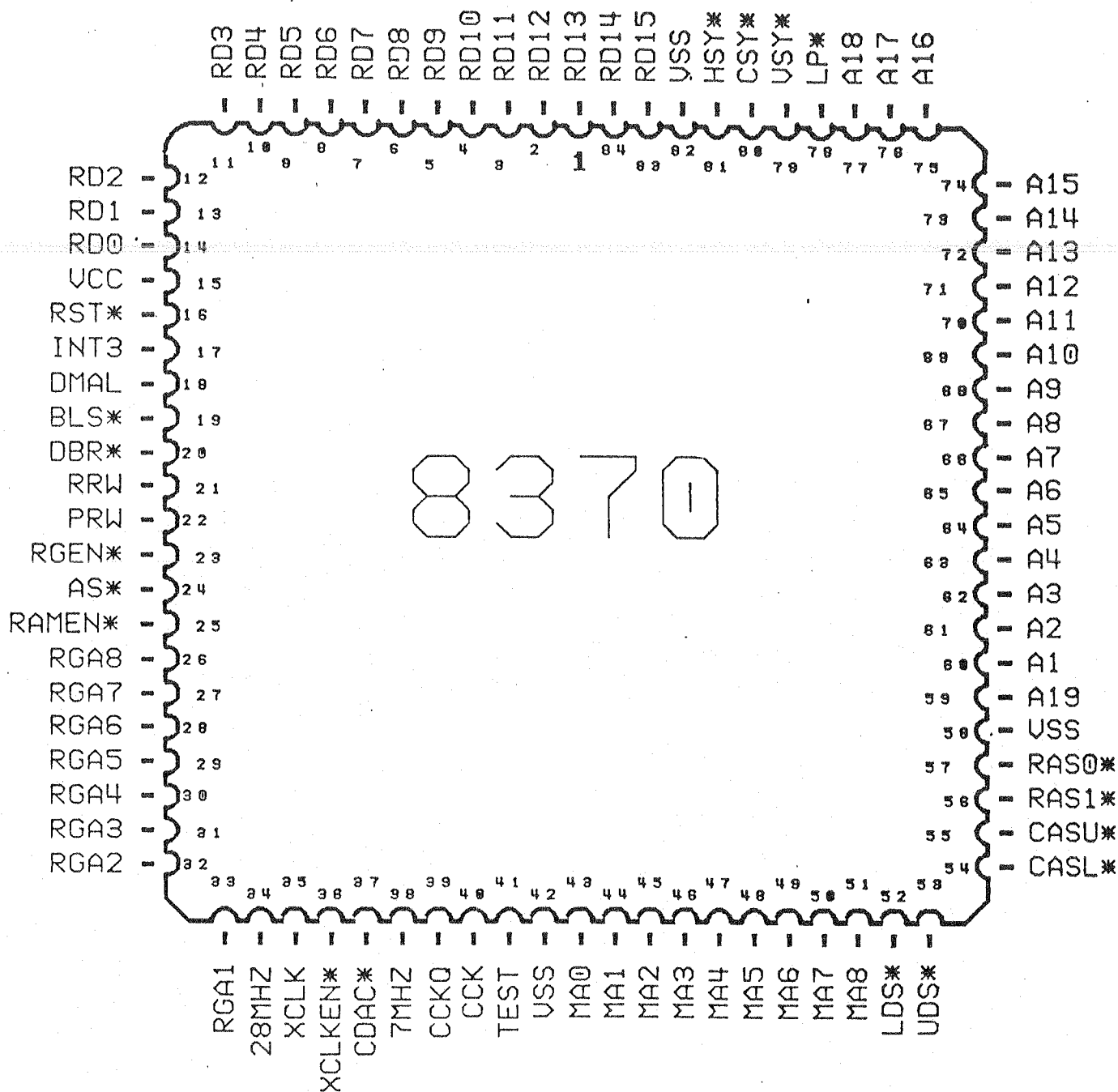
Pin	Name	Description	Type
1-7	D0-D6	Data Bus Lines 0-6	I/O
8	M1H	Mouse 1 Horizontal	I
9	M0H	Mouse 0 Horizontal	I
10-17	RGA1-8	Register Address 1-8	I
18	/BURST	Color Burst	O
19	Vcc	+5 VDC	I
20-23	R0-3	Video Red Bit 0-3	O
24-27	B0-3	Video Blue Bit 0-3	O
28-31	G0-3	Video Green Bit 0-3	O
32	N/C	No Connection	N/C
33	/ZD	Background Indicator	O
34	N/C	No Connection	N/C
35	7M	7.15909 MHz Clock	I
36	CCK	Color Clock	I
37	Vss	Ground	I
38	M0V	Mouse 0 Vertical	I
39	M1V	Mouse 1 Vertical	I
40-48	D7-D15	Data Bus Lines 7-15	I/O



Denise Block Diagram

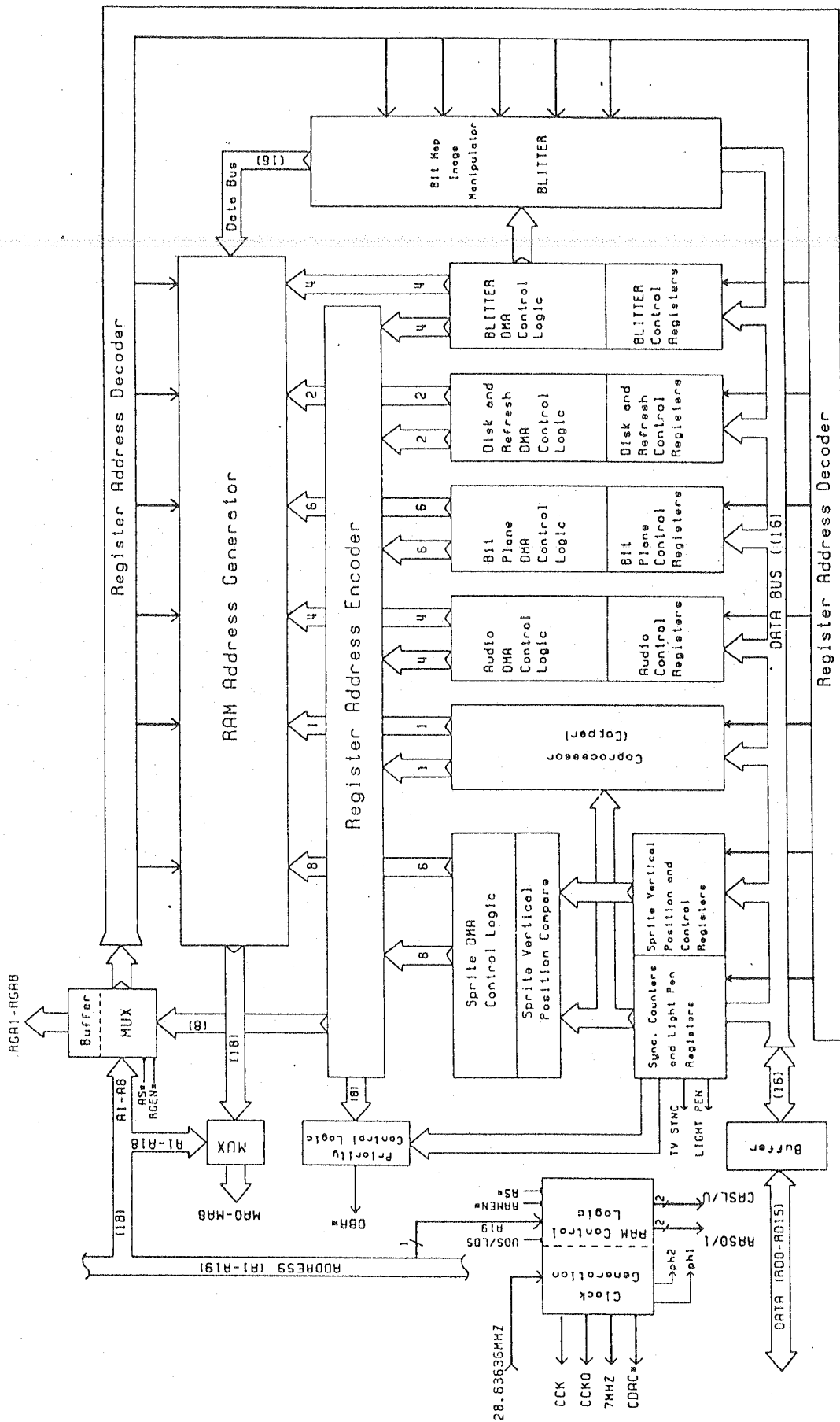
Custom Animation Chip

Fat Agnus



Features:

- Bit Blitter—Uses hardware to move display data—Allows high speed animation—Frees the CPU for other concurrent tasks
- Display Synchronized Coprocessor
- Controls 25 DMA Channels—Allows the disk and sound to operate with minimal CPU intervention
- Generates all system clocks from the 28 Mhz oscillator
- Generates all control signals for the video RAM and expansion RAM card
- Provides the address to the video and expansion RAM multiplexing



Fat Agnus Block Diagram

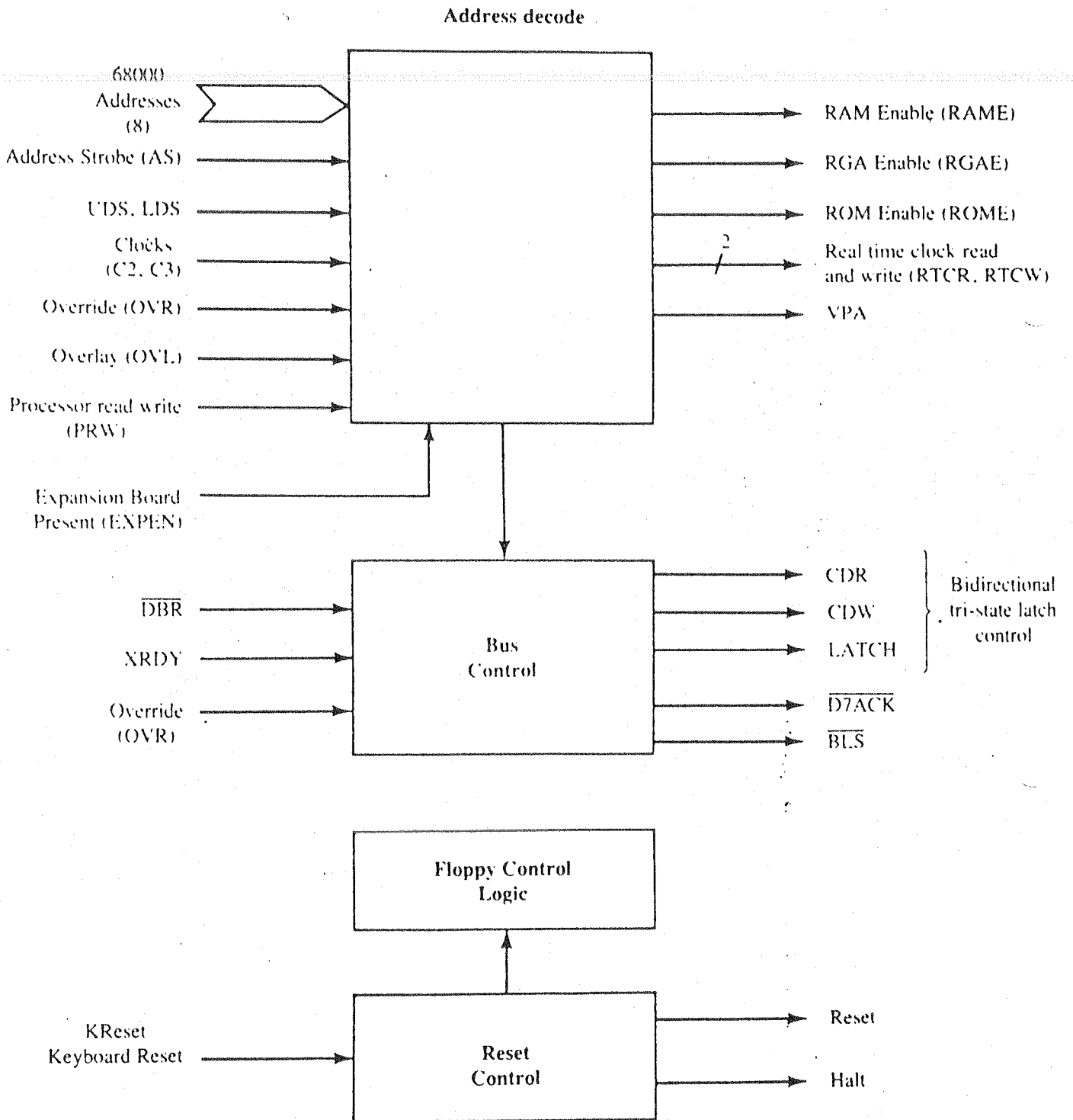
Custom Control Chip Gary

GND--	1		48	--VCC
VDA--	2		47	--MTRX
DEL--	3		46	--MTRON
DEB--	4		45	--BKWDB
KB RESET--	5		44	--DKWEB
VCC--	6		43	--DTACK
MTR--	7		42	--HCT
DKWE--	8		41	--RST
DKWD--	9	U 5	40	--GND
LDS--	10		39	--A 23
UDS--	11		38	--A 22
R/W--	12		37	--A 21
AS--	13	G A R Y	36	--A 20
BGACK--	14		35	--A 19
BLIT--	15		34	--A 18
SEL 0--	16		33	--A 17
VCC--	17		32	--EXRAM
REGEN--	18		31	--XRDY
BLISS--	19		30	--QUL
RAMEN--	20		29	--OVR
ROMEN--	21		28	--CCK
CLKRD--	22		27	--CCKQ
CLKWR--	23		26	--CDAAC
GND--	24		25	--LATCH

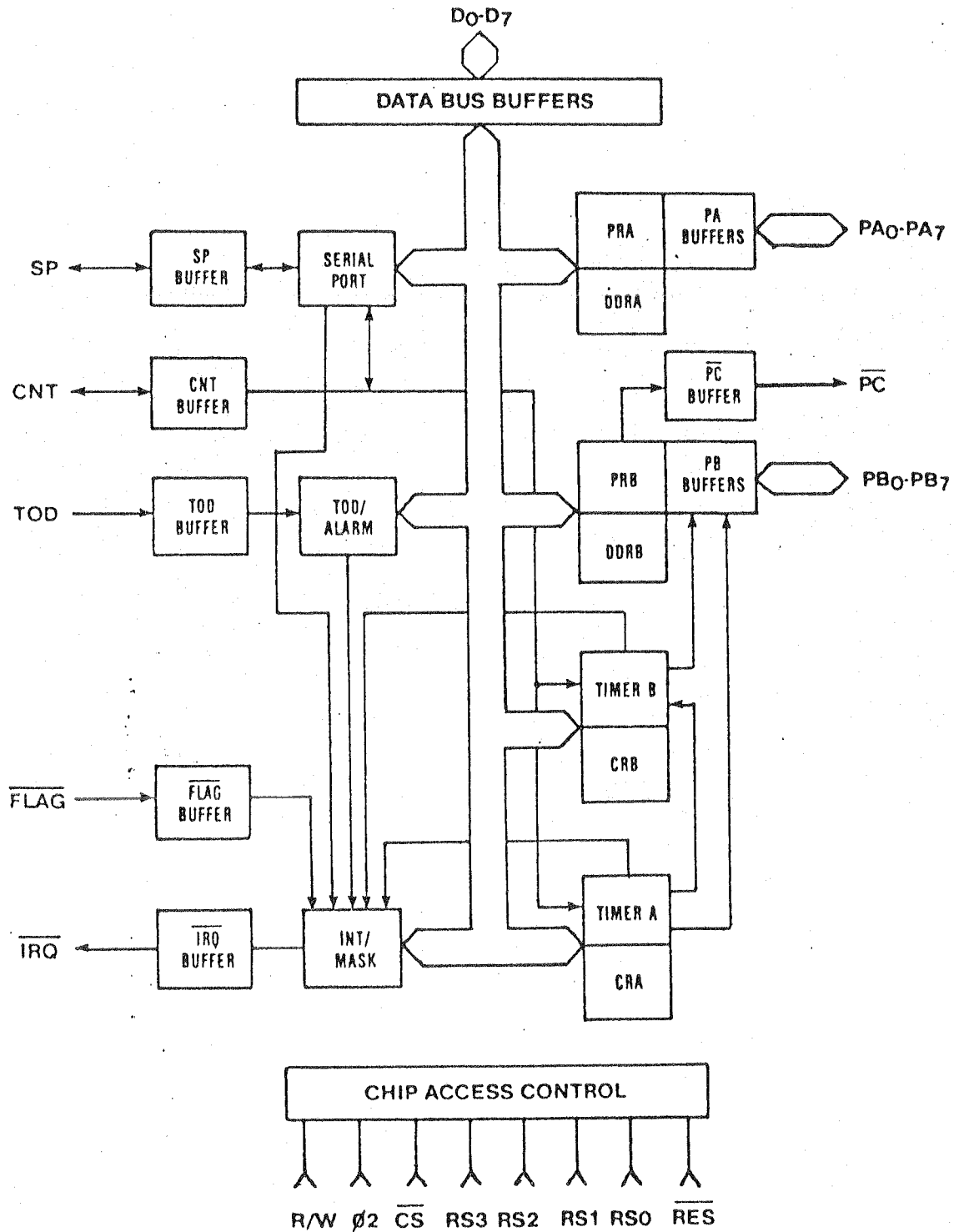
Features:

- Provides all bus control signals.
- Provides all address decoding.
- Generates the 68000 VPA signal.
- Handles some of the floppy circuitry.
- Provides keyboard reset interface.

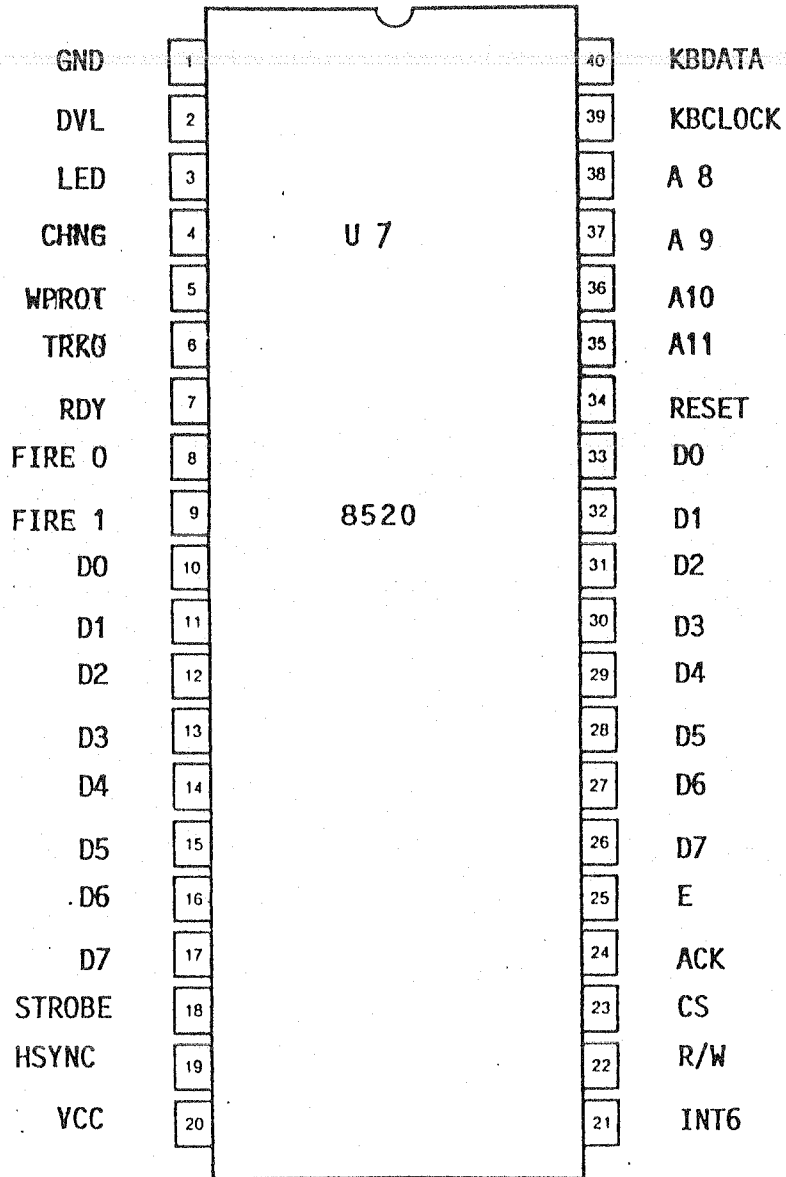
Gary Block Diagram



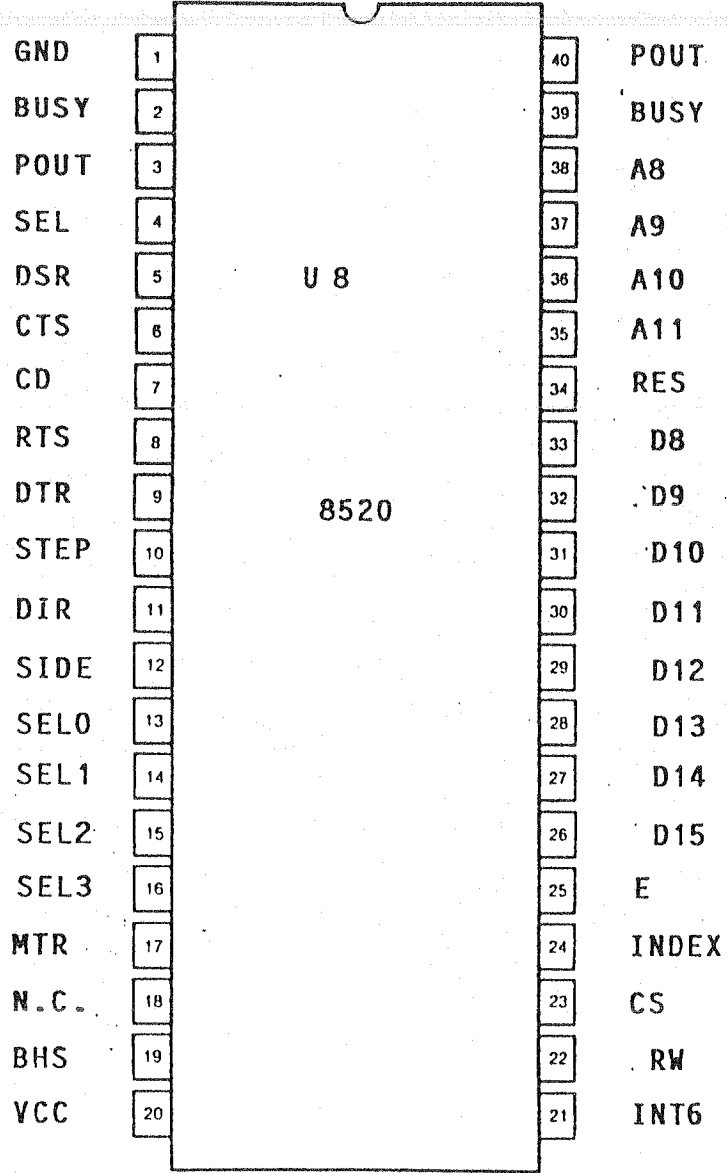
Allgemeines Blockdiagramm Portbausteine 8529



— PORT 8520 —

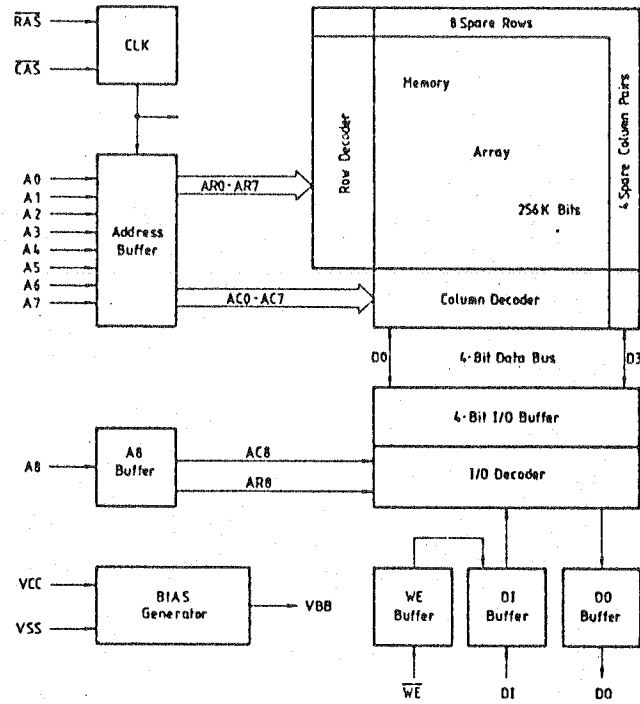


— PORT 8520 —

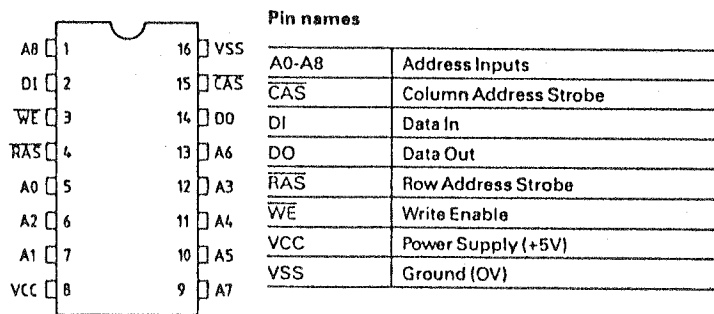


— 256 K * 1 DRAM —

a) Block-Diagramm



b) Pin-Belegung



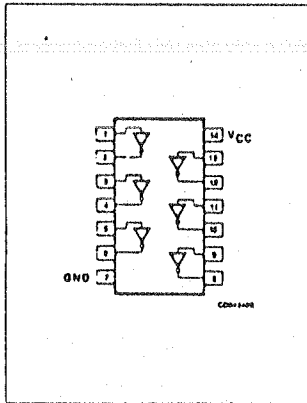
Pin names	
A0-A8	Address Inputs
CAS	Column Address Strobe
DI	Data In
DO	Data Out
RAS	Row Address Strobe
WE	Write Enable
VCC	Power Supply (+5V)
VSS	Ground (0V)



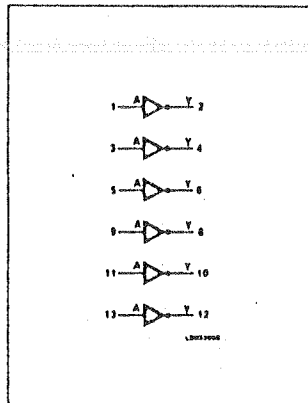
74 LS 04

Inverter

PIN CONFIGURATION



LOGIC SYMBOL



FUNCTION TABLE

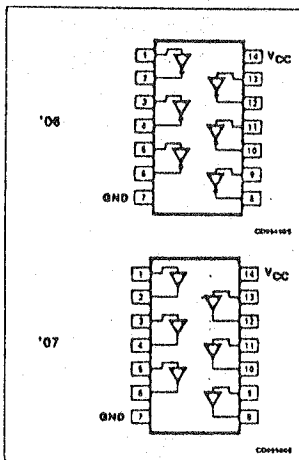
INPUT	OUTPUT
A	Y
L	H
H	L

H = HIGH voltage level
L = LOW voltage level

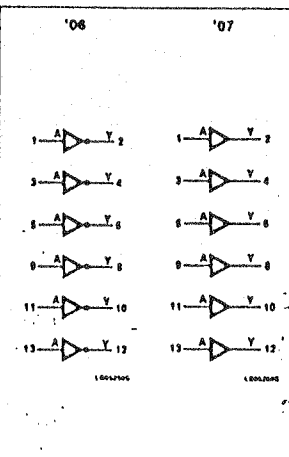
7407

Buffer

PIN CONFIGURATION



LOGIC SYMBOL



FUNCTION TABLE

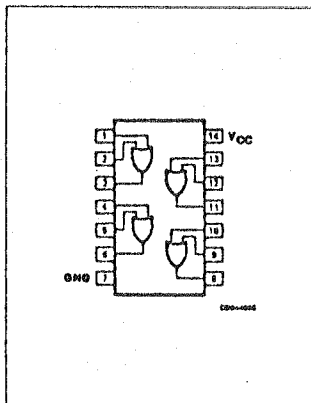
'06		'07	
INPUT	OUTPUT	INPUT	OUTPUT
A	Y	A	Y
H	H	H	H
L	L	L	L

H = HIGH voltage level
L = LOW voltage level

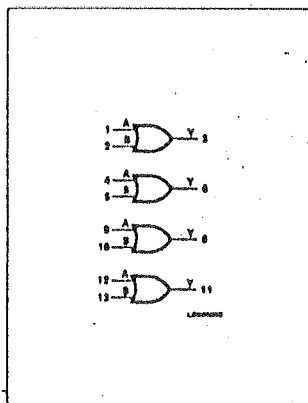
74 LS 32

Or Gate

PIN CONFIGURATION



LOGIC SYMBOL



FUNCTION TABLE

INPUTS		OUTPUT
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	H

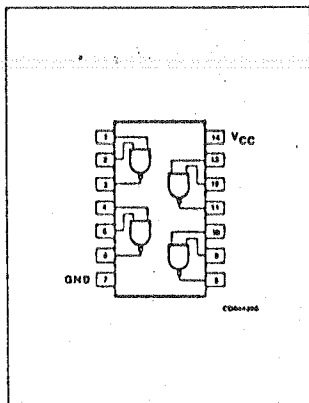
H = HIGH voltage level
L = LOW voltage level



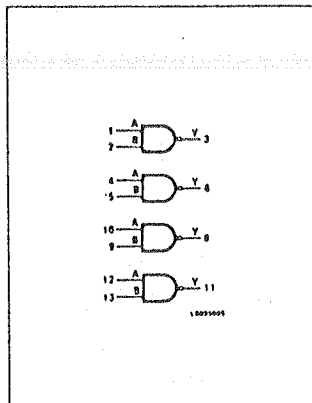
74 38

Nand Buffer

PIN CONFIGURATION



LOGIC SYMBOL



FUNCTION TABLE

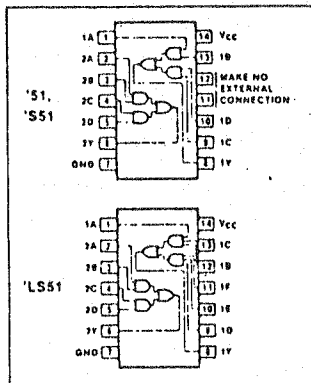
INPUTS		OUTPUT
A	B	Y
L	L	H
L	H	H
H	L	H
H	H	L

H = HIGH voltage level
L = LOW voltage level

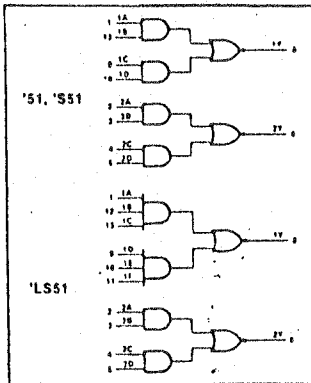
74 S 51

2Input And-Or-Gate

PIN CONFIGURATION



LOGIC SYMBOL



FUNCTION TABLE
'S1, 'S51, 1/2 'LS51

INPUTS				OUTPUT
A	B	C	D	Y
H	H	X	X	L
X	X	H	H	L
All other combinations				H

'LS51

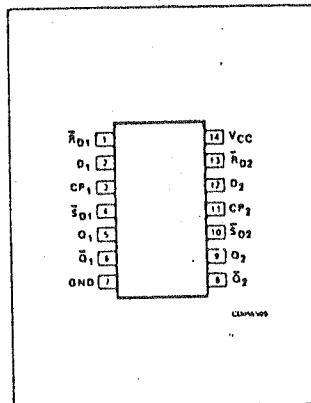
INPUTS						OUTPUT
A	B	C	D	E	F	Y
H	H	H	X	X	X	L
X	X	X	H	H	H	L
All other combinations						H

H = HIGH voltage level
L = LOW voltage level
X = Don't care

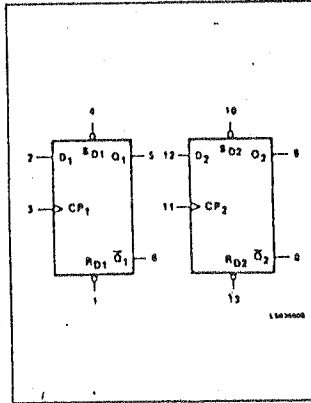
74 LS 74

Dual D-Type Flip-Flop

PIN CONFIGURATION



LOGIC SYMBOL



MODE SELECT — FUNCTION TABLE

OPERATING MODE	INPUTS			OUTPUTS		
	S _D	R _D	CP	D	O	Ō
Asynchronous Set	L	H	X	X	H	L
Asynchronous Reset (Clear)	H	L	X	X	L	H
Undetermined ⁽¹⁾	L	L	X	X	H	H
Load "1" (Set)	H	H	↑	h	H	L
Load "0" (Reset)	H	H	↑	l	L	H

H = HIGH voltage level steady state.
h = HIGH voltage level one set-up time prior to the LOW-to-HIGH clock transition.
L = LOW voltage level steady state.
l = LOW voltage level one set-up time prior to the LOW-to-HIGH clock transition.
X = Don't care.
↑ = LOW-to-HIGH clock transition.

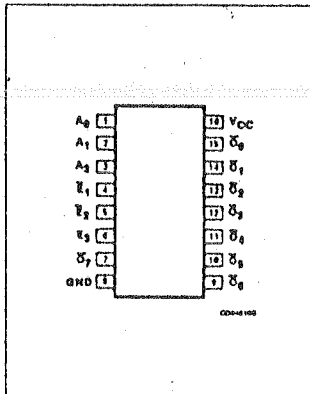
NOTE:
(1) Both outputs will be HIGH while both S_D and R_D are LOW, but the output states are unpredictable if S_D and R_D go HIGH simultaneously.



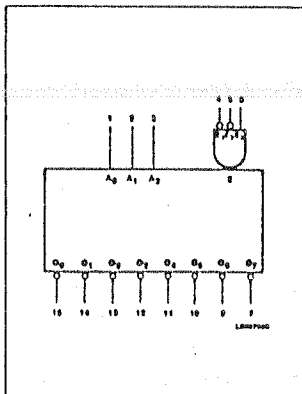
74 LS 138

1 of 8 Decoder / Demultiplexer

PIN CONFIGURATION



LOGIC SYMBOL



FUNCTION TABLE

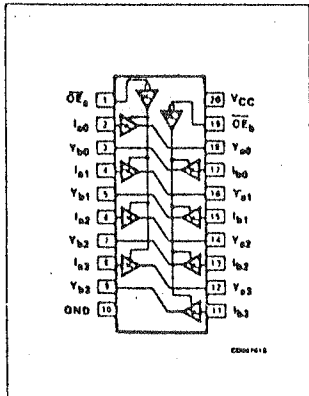
INPUTS						OUTPUTS							
E ₁	E ₂	E ₃	A ₀	A ₁	A ₂	0	1	2	3	4	5	6	7
H	X	X	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	L	X	X	X	H	H	H	H	H	H	H	H
L	L	H	L	L	L	L	H	H	H	H	H	H	H
L	L	H	H	L	L	H	L	H	H	H	H	H	H
L	L	H	H	H	L	H	H	H	L	H	H	H	H
L	L	H	L	L	H	H	H	H	H	L	H	H	H
L	L	H	H	L	H	H	H	H	H	H	L	H	H
L	L	H	L	H	H	H	H	H	H	H	H	L	H
L	L	H	H	H	H	H	H	H	H	H	H	H	L

H = HIGH voltage level
L = LOW voltage level
X = Don't care

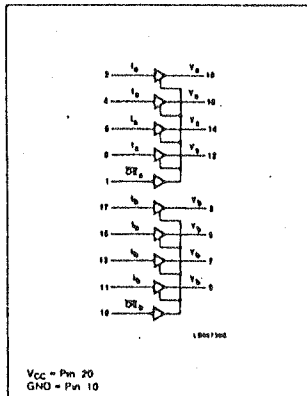
74 LS 244

Octal Buffer

PIN CONFIGURATION



LOGIC SYMBOL



FUNCTION TABLE

INPUTS				OUTPUTS	
OE _a	I _b	OE _b	I _b	Y _a	Y _b
L	L	L	L	L	L
L	H	L	H	H	H
H	X	H	X	(Z)	(Z)

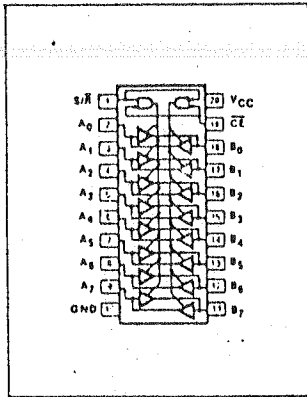
H = HIGH voltage level
L = LOW voltage level
X = Don't care
(Z) = HIGH impedance (off) state



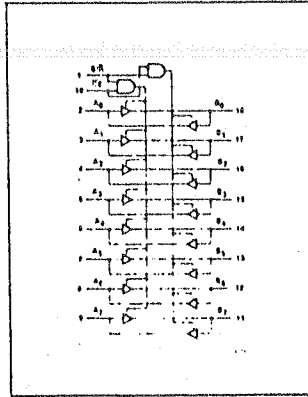
74 LS 245

Octal Transceiver

PIN CONFIGURATION



LOGIC SYMBOL



FUNCTION TABLE

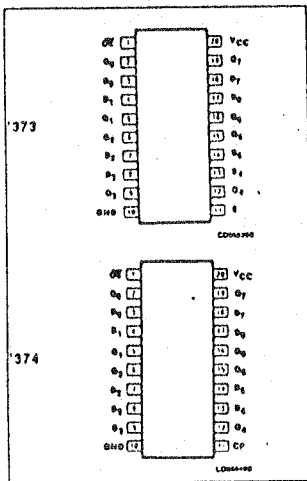
INPUTS		INPUTS/OUTPUTS	
OE	s/R	A _n	B _n
L	L	A = B	INPUTS
L	H	INPUT	B = A
H	X	(Z)	(Z)

H = HIGH voltage level
 L = LOW voltage level
 X = Don't care
 (Z) = HIGH impedance "off" state

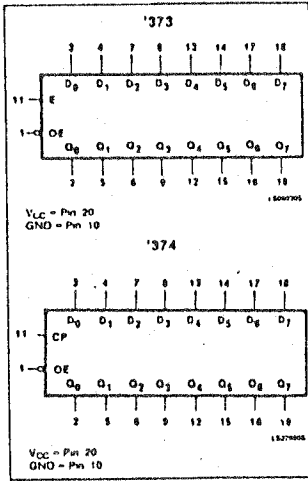
74 LS 373/374

Latch

PIN CONFIGURATION



LOGIC SYMBOL



MODE SELECT — FUNCTION TABLE '373

OPERATING MODES	INPUTS			INTERNAL REGISTER	OUTPUTS
	OE	E	D _n		Q ₀ - Q ₇
Enable and read register	L	H	L	L	L
	L	H	H	H	H
Latch and read register	L	L	l	L	L
	L	L	h	H	H
Latch register and disable outputs	H	L	l	L	(Z)
	H	L	h	H	(Z)

MODE SELECT — FUNCTION TABLE '374

OPERATING MODES	INPUTS			INTERNAL REGISTER	OUTPUTS
	OE	CP	D _n		Q ₀ - Q ₇
Load and read register	L	↑	l	L	L
	L	↑	h	H	H
Load register and disable outputs	H	↑	l	L	(Z)
	H	↑	h	H	(Z)

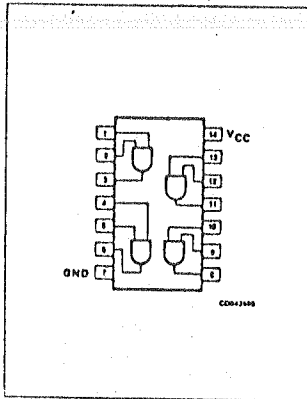
H = HIGH voltage level
 h = HIGH voltage level one set-up time prior to the LOW-to-HIGH clock transition or HIGH-to-LOW OE transition
 L = LOW voltage level
 l = LOW voltage level one set-up time prior to the LOW-to-HIGH clock transition or HIGH-to-LOW OE transition
 (Z) = HIGH impedance "off" state
 ↑ = LOW-to-HIGH clock transition



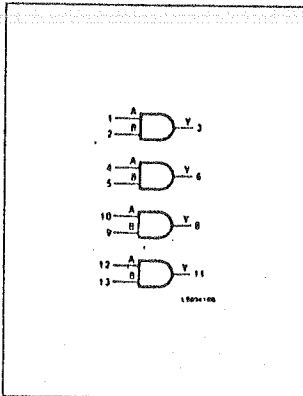
74 F 08

And Gate

PIN CONFIGURATION



LOGIC SYMBOL



FUNCTION TABLE

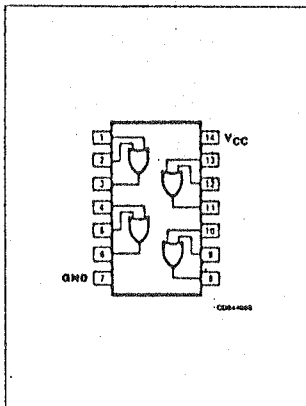
INPUTS		OUTPUT
A	B	Y
L	L	L
L	H	L
H	L	L
H	H	H

H = HIGH voltage level
L = LOW voltage level

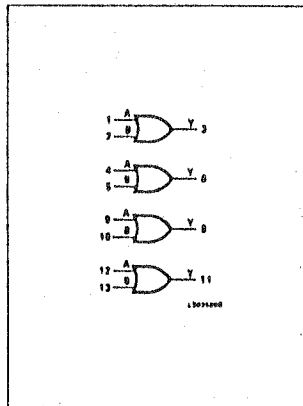
74 F 32

Or Gate

PIN CONFIGURATION



LOGIC SYMBOL



FUNCTION TABLE

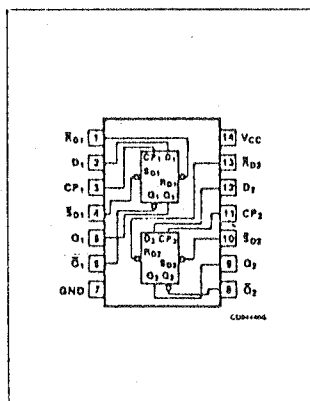
INPUTS		OUTPUT
A	B	Y
L	L	L
L	H	H
H	L	H
H	H	H

H = HIGH voltage level
L = LOW voltage level

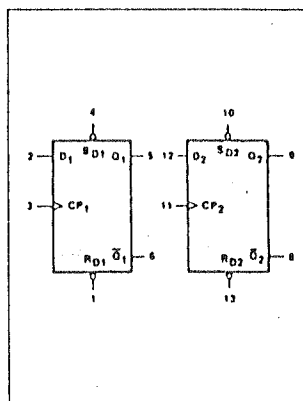
74 F 74

Dual D-Type Flip-Flop

PIN CONFIGURATION



LOGIC SYMBOL



MODE SELECT — FUNCTION TABLE

OPERATING MODE	INPUTS			OUTPUTS	
	\bar{S}_0	\bar{R}_0	CP	Q	\bar{Q}
Asynchronous Set	L	H	X	X	H
Asynchronous Reset (Clear)	H	L	X	X	L
Undetermined ⁽¹⁾	L	L	X	X	H
Load "1" (Set)	H	H	↑	h	H
Load "0" (Reset)	H	H	↓	l	L

H = HIGH voltage level steady state.
h = HIGH voltage level one set-up time prior to the LOW-to-HIGH clock transition.

L = LOW voltage level steady state.
l = LOW voltage level one set-up time prior to the LOW-to-HIGH clock transition.

X = Don't care.
↑ = LOW-to-HIGH clock transition

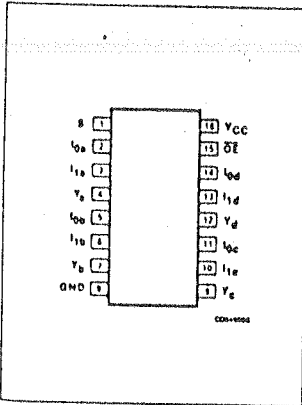
NOTE:

(1) Both outputs will be HIGH if both \bar{S}_0 and \bar{R}_0 go LOW simultaneously

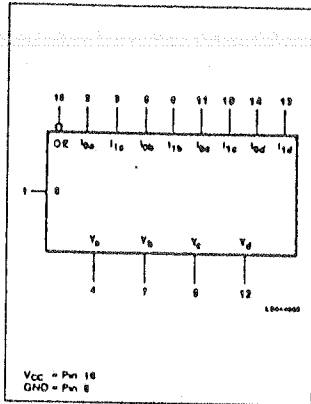


74 F 257 2Line to 1Line Multiplexer

PIN CONFIGURATION



LOGIC SYMBOL



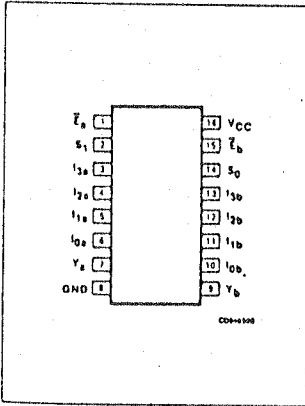
FUNCTION TABLE

OE	INPUTS			OUTPUT
	S	I ₀	I ₁	Y
H	X	X	X	(Z)
L	H	X	L	L
L	H	X	H	H
L	L	L	X	L
L	L	L	H	H

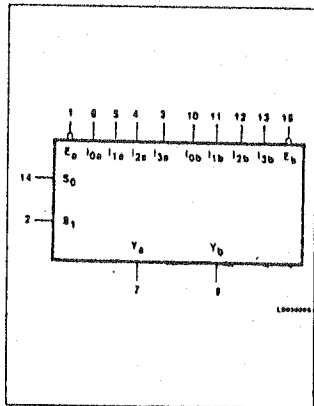
H = HIGH voltage level
 L = LOW voltage level
 X = Don't care
 (Z) = HIGH impedance (off) state

74 F 153 4Line to 1Line Multiplexer

PIN CONFIGURATION



LOGIC SYMBOL



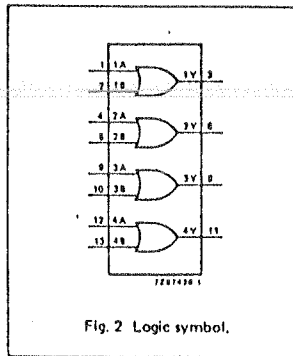
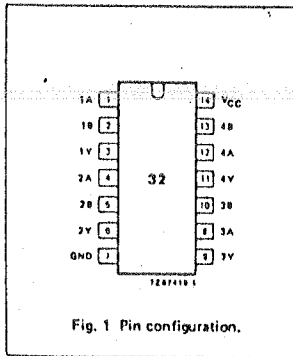
FUNCTION TABLE

SELECTS INPUTS		INPUTS (a or b)					OUTPUT
S ₀	S ₁	E	I ₀	I ₁	I ₂	I ₃	Y
X	X	H	X	X	X	X	L
L	L	L	L	X	X	X	L
L	L	L	H	X	X	X	H
H	L	L	X	L	X	X	L
H	L	L	X	H	X	X	H
L	H	L	X	X	L	X	L
L	H	L	X	X	H	X	H
H	H	L	X	X	X	L	L
H	H	L	X	X	X	H	H

H = HIGH voltage level
 L = LOW voltage level
 X = Don't care

74 HCT 32

Or Gate



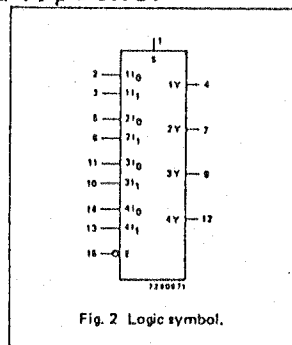
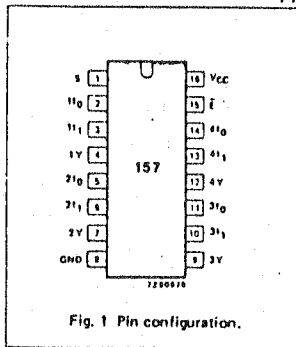
FUNCTION TABLE

INPUTS		OUTPUT
nA	nB	nY
L	L	L
L	H	H
H	L	H
H	H	H

H = HIGH voltage level
L = LOW voltage level

74 HCT 157

2line to 1line
Multiplexer



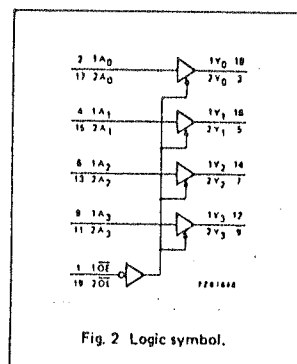
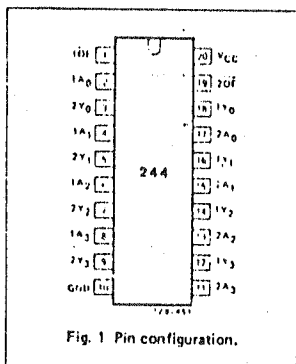
FUNCTION TABLE

INPUTS				OUTPUT
E	S	nI ₀	nI ₁	nY
H	X	X	X	L
L	L	L	X	L
L	L	H	X	H
L	H	X	L	L
L	H	X	H	H

H = HIGH voltage level
L = LOW voltage level
X = don't care

74 HC 244

Octal Buffer



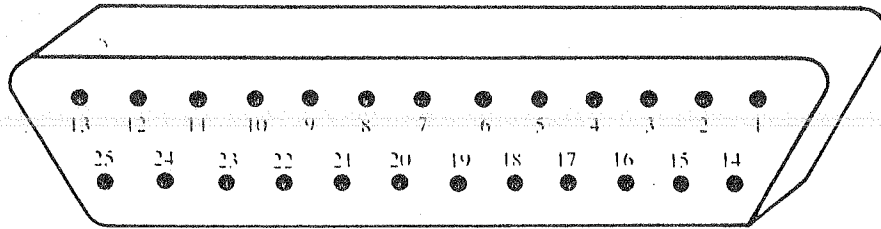
FUNCTION TABLE

INPUTS		OUTPUT
nOE	nA _n	nY _n
L	L	L
L	H	H
H	X	Z

H = HIGH voltage level
L = LOW voltage level
X = don't care
Z = high impedance OFF-state

Serial Connector

In the following table, the second column from the left gives the Amiga pin assignments. The third and fourth columns from the left give pin assignments for other commonly used connections; the information in these two columns is given for comparison only.



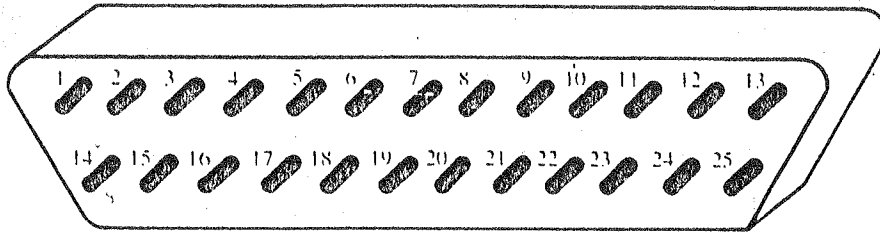
WARNING: Pins 9 and 10 on the Amiga serial connector are used for external power. Connect these pins **ONLY** if power from them is required by the external device. The table lists the power provided by each of these pins.

Pin	Amiga 500	RS232	HAYES®	Description
1	GND	GND	GND	FRAME GROUND
2	TXD	TXD	TXD	TRANSMIT DATA
3	RXD	RXD	RXD	RECEIVE DATA
4	RTS	RTS		REQUEST TO SEND
5	CTS	CTS	CTS	CLEAR TO SEND
6	DSR	DSR	DSR	DATA SET READY
7	GND	GND	GND	SYSTEM GROUND
8	DCD	DCD	DCD	CARRIER DETECT
9	+12V			+12 VOLT CARRIER
10	-12V			-12 VOLT CARRIER
11	AUDIO			AUDIO OUT OF AMIGA
12		S.SD	SI	SPEED INDICATE
13		S.CTS		
14		S.TXD		
15		TXC		
16		S.RXD		
17		RXC		
18	AUDI			AUDIO INTO AMIGA
19		S.RTS		
20	DTR	DTR	DTR	DATA TERMINAL READY
21		SQD		
22	RI	RI	RI	RING INDICATOR
23		SS		
24		TXC1		
25				

Signalbeschreibung der seriellen Schnittstelle

Signalname	Signalrichtung	Bedeutung
TxD	Ausgang	Transmit Data Sendedaten vom PC zur Peripherie
RxD	Eingang	Receive Data Empfangsdaten von der Peripherie zum PC
DSR	Eingang	Data Set Ready Zeigt an, daß ein Peripheriegerät betriebsbereit ist.
CTS	Eingang	Clear to Send zeigt an, daß ein Peripheriegerät empfangsbereit ist.
DTR	Ausgang	Data Terminal Ready zeigt dem Peripheriegerät, daß die serielle Schnittstelle des PC betriebsbereit ist (siehe auch DSR)
RTS	Ausgang	Request to Send Zeigt dem Peripheriegerät an, daß die serielle Schnittstelle, des PC Daten senden will (Siehe auch CTS)
CD	Eingang	Carrier Detect Modemsignal. Es zeigt an, daß ein angeschlossenes Modem einen Träger empfängt.

A500 Parallel Connector



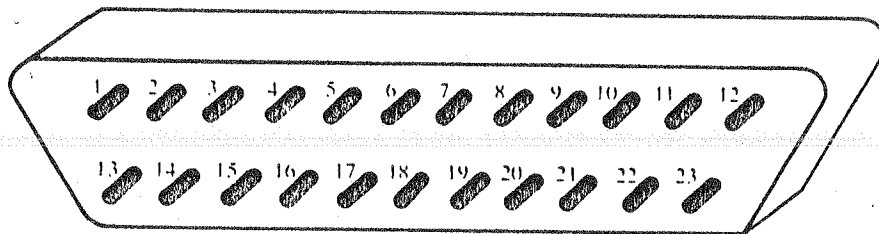
WARNING: Pin 14 on the Amiga parallel connector supplies +5 volts of power. Connect this pin **ONLY** if the power from it is required by the external device. **NEVER** connect this pin to an output of an external device or to a signal ground. Pins 17-25 are for grounding signals. **DO NOT** connect these pins directly to a shield ground.

Pin	Name	Description
1	STROBE*	STROBE
2	D0	DATA BIT 0 (Least sign. bit)
3	D1	DATA BIT 1
4	D2	DATA BIT 2
5	D3	DATA BIT 3
6	D4	DATA BIT 4
7	D5	DATA BIT 5
8	D6	DATA BIT 6
9	D7	DATA BIT 7
10	ACK*	ACKNOWLEDGE
11	BUSY	BUSY
12	POUT	PAPER OUT
13	SEL	SELECT
14	+5V PULLUP	+5 VOLTS POWER (100 mA)
15	NC	NO CONNECTION
16	RESET*	RESET
17	GND	SIGNAL GROUND
18	GND	SIGNAL GROUND
19	GND	SIGNAL GROUND
20	GND	SIGNAL GROUND
21	GND	SIGNAL GROUND
22	GND	SIGNAL GROUND
23	GND	SIGNAL GROUND
24	GND	SIGNAL GROUND
25	GND	SIGNAL GROUND

Signalbeschreibung der Centronics-Schnittstelle

DRDY	Dieses Signal wird aktiv, wenn die Daten (Data 0-7) stabil sind. Es weist den Drucker an, die anliegenden Daten zu übernehmen. Das Signal ist normalerweise High und wird LOW, wenn Daten übernommen werden sollen (LOW aktiv).
BUSY	Wenn der Drucker keine Daten übernehmen kann, aktiviert er dieses Signal (HIGH aktiv). In folgenden Fällen tritt dieser Zustand ein: 1. Kurz nach der Datenübernahme 2. Während des Druckvorganges 3. Drucker nicht bereit (Off-Line) 4. Wenn der Drucker gestört ist
ACK	Dieses Signal stellt die Quittung dar, daß die Daten vom Drucker übernommen worden sind und er bereit ist, neue Daten zu empfangen (LOW aktiv).
POUT	Dieses Signal meldet, daß kein Papier mehr im Drucker vorhanden worden ist (High aktiv).
SLCT	Dieses Signal quittiert, daß der Drucker ausgewählt worden ist (High aktiv)
DATA 0-7	Auf diesen Leitungen werden die Informationen (8 Bit) parallel übertragen: HIGH Pegel bei logisch *1* LOW Pegel bei logisch *0*

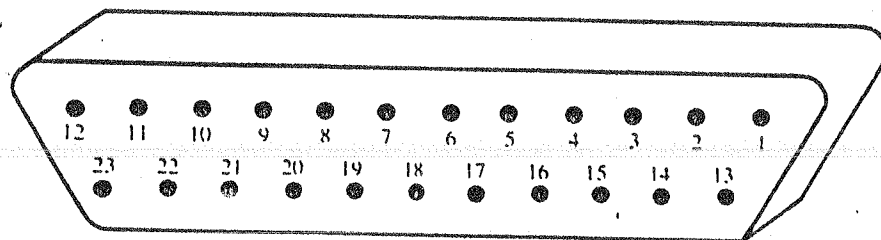
RGB Monitor Connector



WARNING: Pins 21, 22, and 23 on the RGB monitor connector are used for external power. Connect these pins **ONLY** if power from them is required by the external device. The table lists the power provided by each of these pins.

Pin	Name	Description
1	XCLK*	EXTERNAL CLOCK
2	XCLKEN*	EXTERNAL CLOCK ENABLE
3	RED	ANALOG RED
4	GREEN	ANALOG GREEN
5	BLUE	ANALOG BLUE
6	DI	DIGITAL INTENSITY
7	DB	DIGITAL BLUE
8	DG	DIGITAL GREEN
9	DR	DIGITAL RED
10	CSYNC*	COMPOSITE SYNC
11	HSYNC*	HORIZONTAL SYNC
12	VSNC*	VERTICAL SYNC
13	GNDRTN	RETURN FOR XCLKEN*
14	ZD*	ZERO DETECT
15	C1*	CLOCK OUT
16	GND	GROUND
17	GND	GROUND
18	GND	GROUND
19	GND	GROUND
20	GND	GROUND
21	- 12V	- 12 VOLTS POWER (50 mA)
22	+ 12V	+ 12 VOLTS POWER (100 mA)
23	+ 5V	+ 5 VOLTS POWER (100 mA)

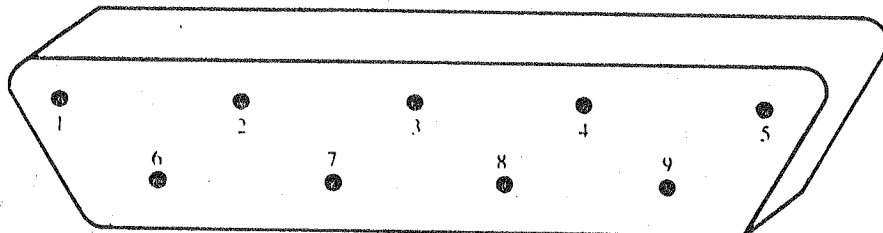
External Disk Connector



Pin	Name	Description
1	/RDY	Disk Ready—Active Low
2	/DKRD	Disk Ready Data—Active Low
3-7	GND	Ground
8	/MTRXD	Disk Motor Control—Active Low
9	/SEL2B	Select Drive 2—Active Low
10	/DRESB	Disk RESET—Active Low
11	/CHNG	Disk has been Removed from Drive—Latched Low
12	+5	5 VDC Supply
13	/SIDE B	Select Disk Side—0 = Upper 1 = Lower
14	/WPRO	Disk is Write Protected—Active Low
15	/TKO	Drive Head Position over Track 0—Active Low
16	/DKWE	Disk Write Enable—Active Low
17	/DKWD	Disk Write Data—Active Low
18	/STEPB	Step the Head—Pulse, First Low then High
19	DIRB	Select Head Direction—0 = Inner 1 = Outer
20	/SEL3B	Select Drive 3—Active Low
21	/SEL1B	Select Drive 1—Active Low
22	/INDEX	Disk Index Pulse—Active Low
23	+12	12 VDC Supply

Mouse/Game Controller Connectors

There are connectors labeled "JOY1" and "JOY2" on the back of the Amiga 500. If you use a mouse to control the Workbench, you must attach it to connector JOY 1. You can attach joystick controllers to either of the connectors. To use a light pen, you must attach it to connector 1. The following tables describe mouse, game controller, and light pen connections.



WARNING: Pin 7 on each of these connectors supplies +5 volts of power. Connect this pin ONLY if power from it is required by the external device.

Connectors 1 and 2: Mouse Connections

Pin	Name	Description
1	MOUSE V	MOUSE VERTICAL
2	MOUSE H	MOUSE HORIZONTAL
3	MOUSE VQ	VERTICAL QUADRATURE
4	MOUSE HQ	HORIZONTAL QUADRATURE
5	MOUSE BUTTON 2	MOUSE BUTTON 2
6	MOUSE BUTTON 1	MOUSE BUTTON 1
7	+5V	+5 VOLTS POWER (100 mA)
8	GND	GROUND
9	MOUSE BUTTON 3	MOUSE BUTTON 3

Connectors 1 and 2: Game Controller

Pin	Name	Description
1	FORWARD*	CONTROLLER FORWARD
2	BACK*	CONTROLLER BACK
3	LEFT*	CONTROLLER LEFT
4	RIGHT*	CONTROLLER RIGHT
5	POT X	HORIZONTAL POTENTIOMETER
6	FIRE*	CONTROLLER FIRE
7	+5V	+5 VOLTS POWER (100 mA)
8	GND	GROUND
9	POT Y	VERTICAL POTENTIOMETER

Connector 2: Light Pen Connection

Pin	Name	Description
1		
2		
3		
4		
5	LIGHT PEN PRESS	LIGHT PEN TOUCHED TO SCREEN
6	LIGHT PEN*	CAPTURE BEAM POSITION
7	+5V	+5 VOLTS POWER (100 mA)
8	GND	GROUND
9		

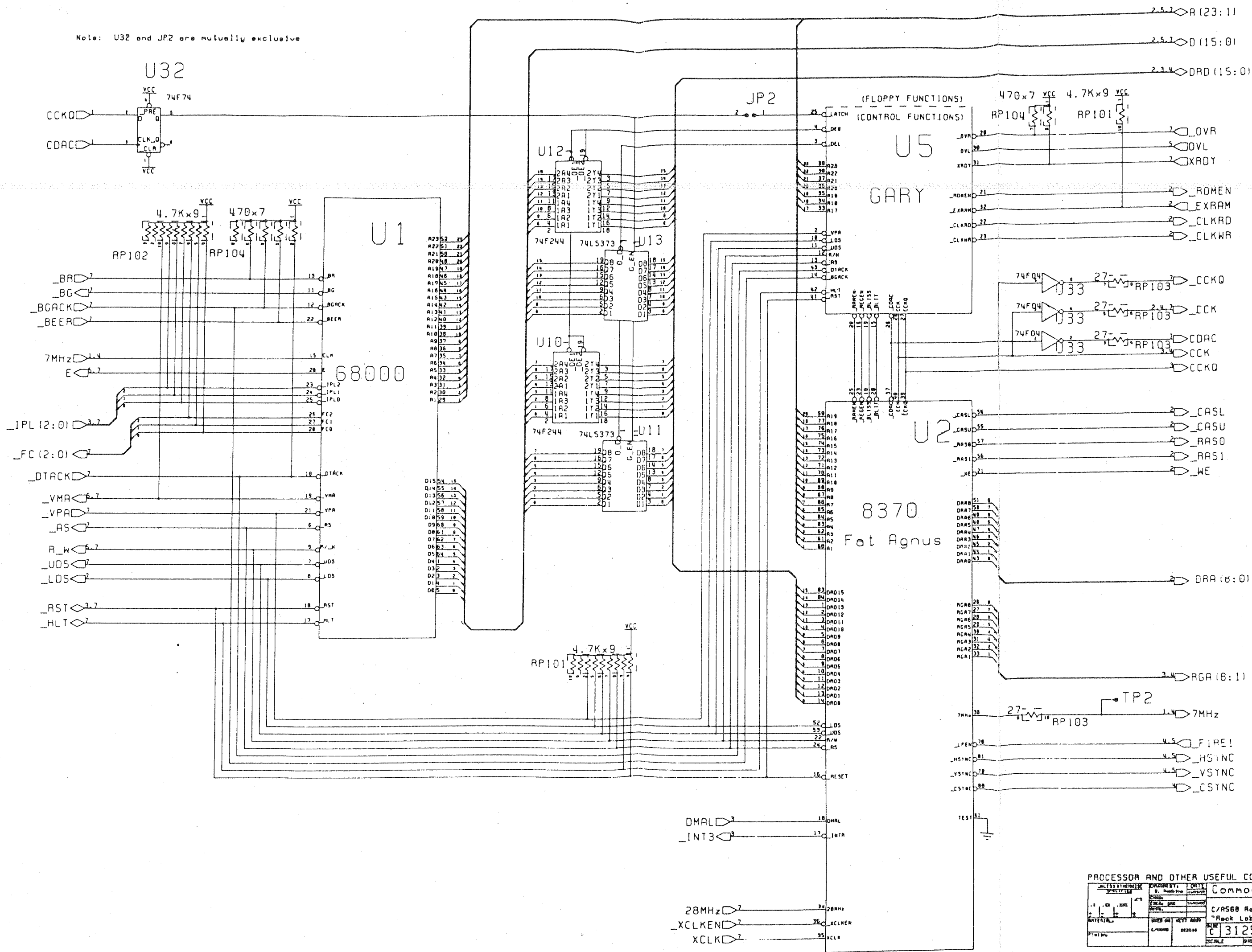
86-Pin Connector

Pin	Name	Pin	Name
1	gnd	44	IPL2*
2	gnd	45	A16
3	gnd	46	BERR*
4	gnd	47	A17
5	+5	48	VPA*
6	+5	49	gnd
7	exp	50	E
8	-12	51	VMA*
9	exp	52	A18
10	+12	53	RES*
11	exp	54	A19
12	CONFIG*	55	HLT*
13	gnd	56	A20
14	C3*	57	A22
15	CDAC	58	A21
16	C1*	59	A23
17	OVR*	60	BR*
18	XRDY	61	gnd
19	INT2*	62	BGACK*
20	PALOPE*	63	PD15
21	A5	64	BG*
22	INT6*	65	PD14
23	A6	66	DTACK*
24	A4	67	PD13
25	gnd	68	PRW*
26	A3	69	PD12
27	A2	70	LDS*
28	A7	71	PD11
29	A1	72	UDS*
30	A8	73	gnd
31	FC0	74	AS*
32	A9	75	PD0
33	FC1	76	PD10
34	A10	77	PD1
35	FC2	78	PD9
36	A11	79	PD2
37	gnd	80	PD8
38	A12	81	PD3
39	A13	82	PD7
40	IPL0*	83	PD4
41	A14	84	PD6
42	IPL1*	85	gnd
43	A15	86	PD5

TECHNISCHE DATEN

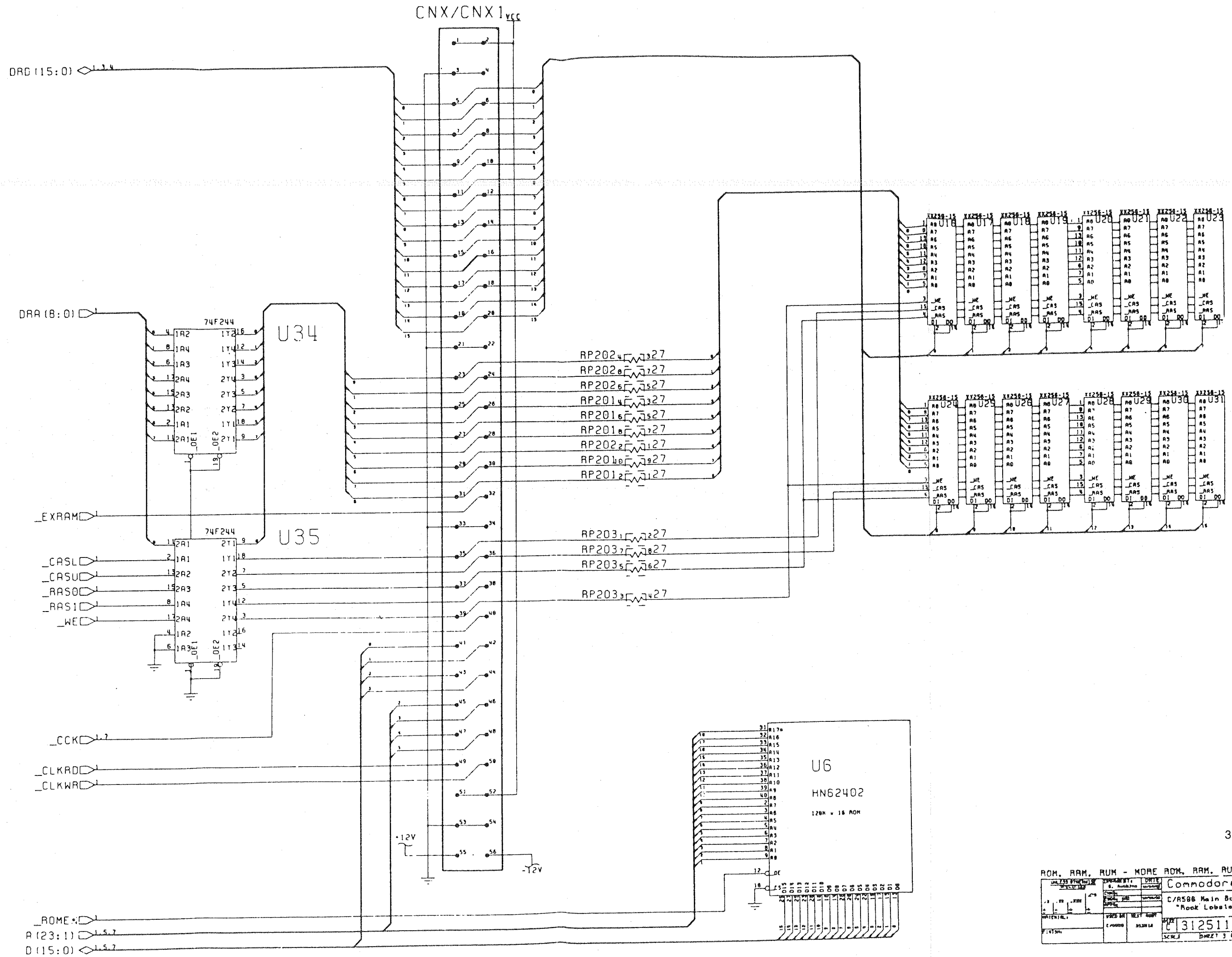
CPU:	Motorola 68000, 16(32) bit, 7,14 Mhz
Co-Prozessoren:	3 Amiga-Spezialprozessoren für DMA, Video, Graphik/Sound
Speicherkapazität: (insgesamt)	Grundversion - 0,75 MB, davon 0,5 MB RAM Arbeitsspeicher und 256 KB ROM für Kickstart 1.2 - Arbeitsspeicher intern über Steckkarte um 512 KB erweitert werden
Massenspeicher:	intern - Grundversion 1 x 3 1/2" Floppy Disk, 880 KB formatiert - optional externe Floppy Disks
Schnittstellen:	seriell - programmierbare RS 232 C bis 31250 Baud, Midi über Adapter parallel - programmierbar, normalerweise als Centronics konfiguriert Controller-Ports - 2 Ports für Maus, Graphiktablets, Light Pen, Drehregler Video/Audio - 2 Ports/Cynch Stereo/Audio, RGB analog/digital
Sprache/Sound:	Ausgabe - über eingebauten Lautsprecher oder externe Tonquellen, 4 getrennte Soundkanäle auf 2 Stereo-Kanälen konfiguriert - 4 D/A-Wandler eingebaut Eingabe - von beliebigen Audioquellen über Digitalisierung, Naturstimmen über Mikrophon
Video:	Eingabe / Ausgabe - über Genlock-Interface/Bildbe- und verarbeitung über Digitalisiereinheit - von beliebigen Videoquellen, wie Kamera, Bildplatte, Fernseher, Bildschirmtext, Scanner - Einbindung in Multitasking Graphik/Textmodus - Graphik 320 x 256, 320 x 512, 640 x 256, 640 x 512 - Text wahlweise 60 oder 80 Zeichen breit, zu 32 Zeilen in Farbe, verschiedene Schriftzeichen unterschiedlicher Größe und Art, Bildschirmfarben von Benutzer definierbar
Betriebssystem:	Amiga-DOS, Multitasking
Monitor:	Farbmonitor, in Grundversion nicht enthalten, Anschluß an Farbfernseher über externen zusätzlichen PAL-Coder
Eingabemedien:	integrierte Tastatur mit 96 Tasten, separater Rechenblock, Funktionstasten, Maus mit 2 Bedienungsknöpfen

Note: U32 and JP2 are mutually exclusive



PROCESSOR AND OTHER USEFUL COMPONENTS

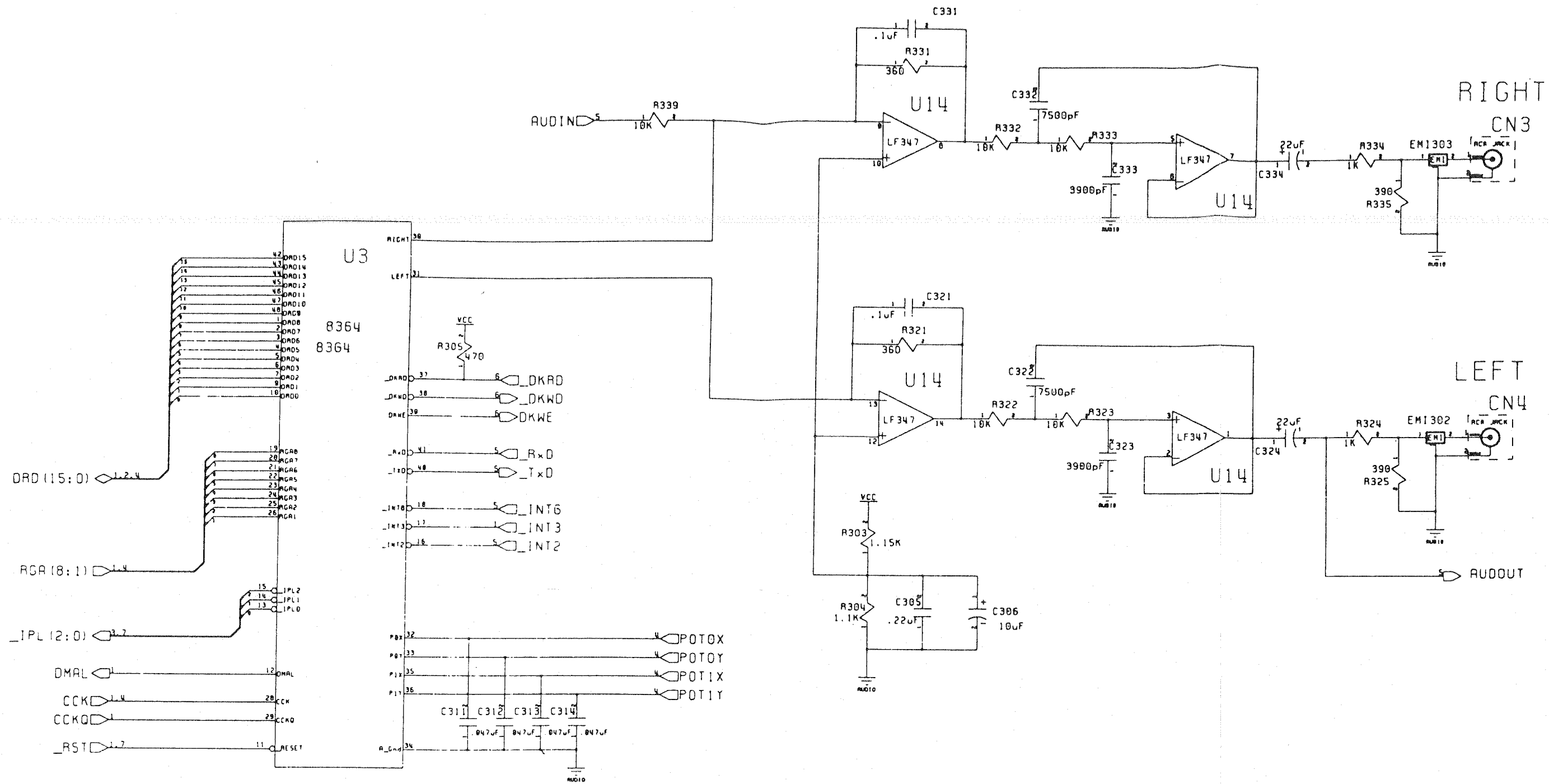
DESIGNED BY:	DATE:	Commodore
CHECKED BY:	DATE:	
APPROVED BY:	DATE:	
C/AS00 Re-in Board "Rock Labeler"		
C 312511		
SCALE SHEET 2 OF 10		



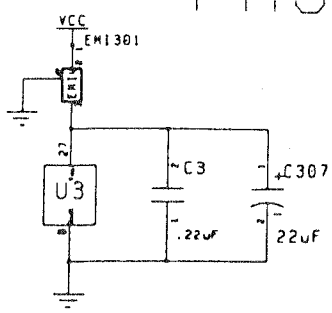
ROM, RAM, ROM - MORE ROM, RAM, ROM!

DATE	BY	DESCRIPTION	REVISION
01/15/80
02/15/80
03/15/80
04/15/80
05/15/80
06/15/80
07/15/80
08/15/80
09/15/80
10/15/80
11/15/80
12/15/80

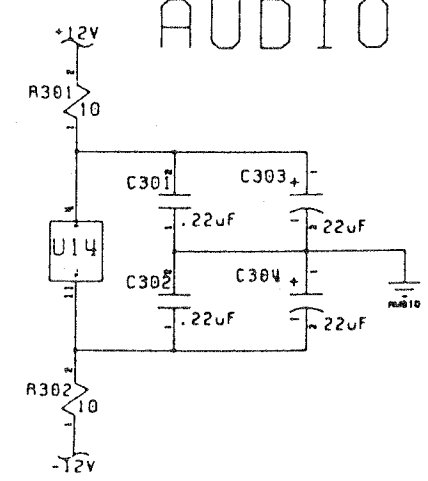
Commodore
 C/RS88 Main Board
 "Rock Lobster"
 312511
 SHEET 3 OF 18



PAULA POWER!

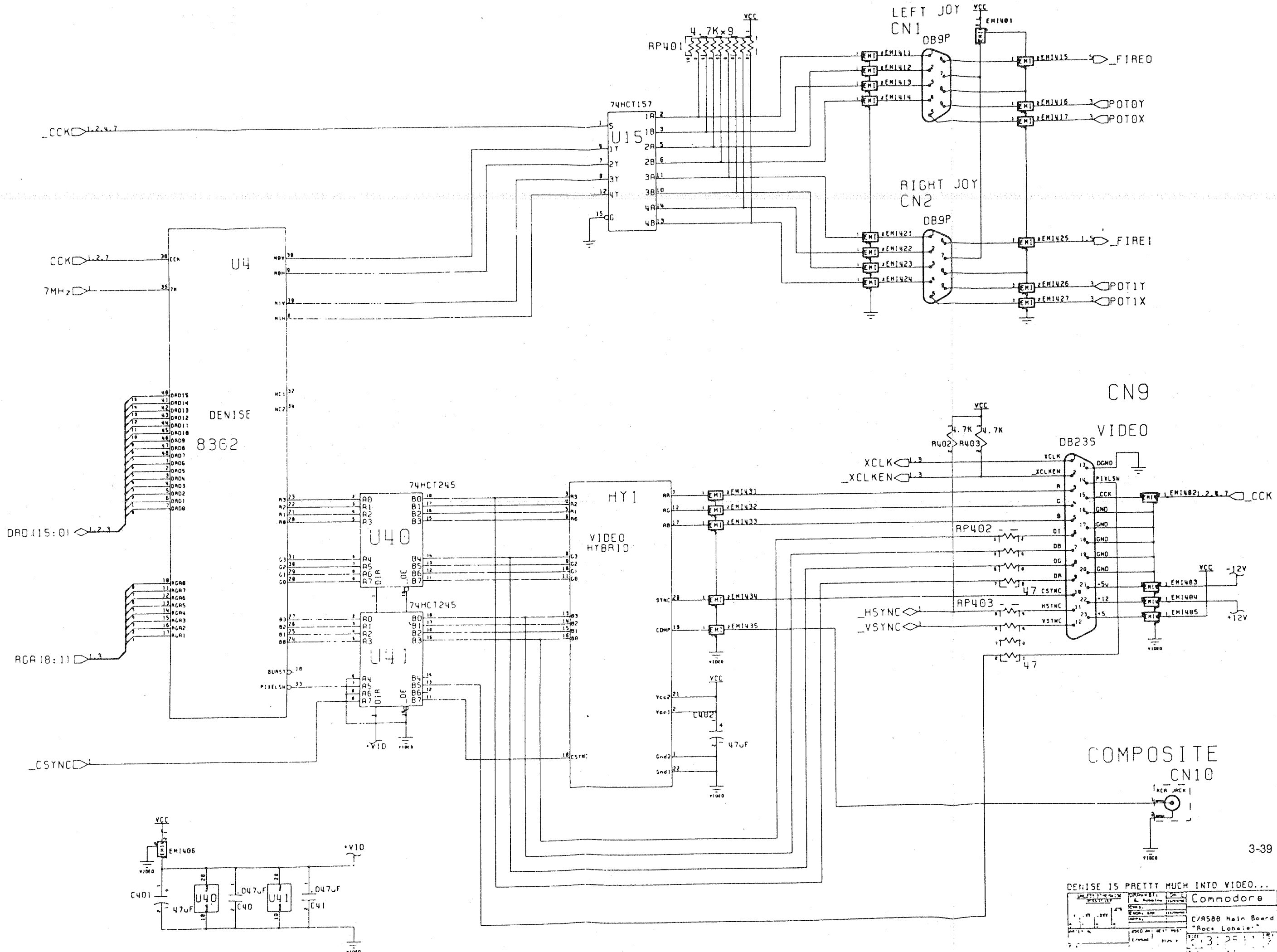


AUDIO POWER



PAULA DOES THINGS THAT DENISE DOESN'T

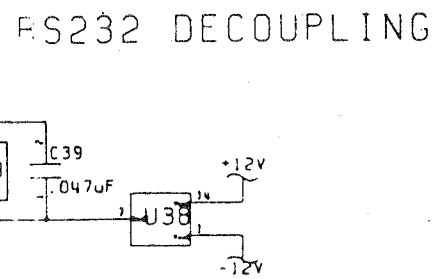
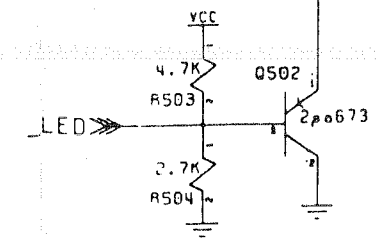
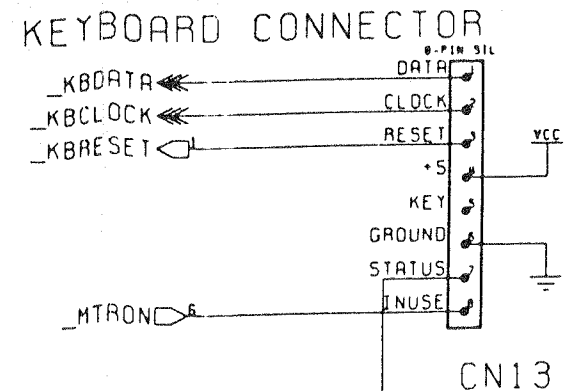
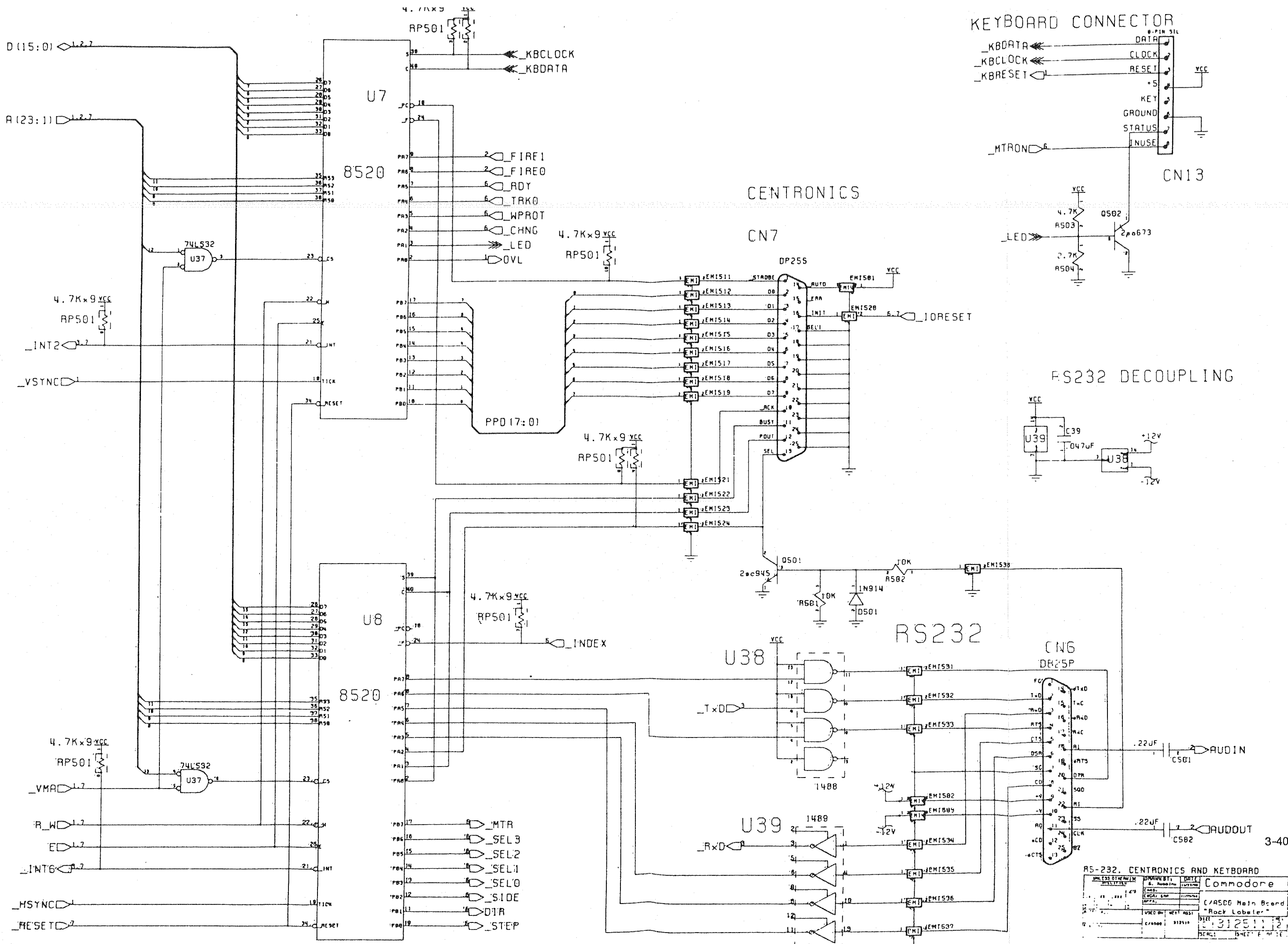
DATE	DESIGNED BY	DATE	Commodore
11/7/80	W. S. Roper	11/7/80	
1	EX	REV	
			C/R580 Main Board
			"Rock Labeler"
11/15/80	W. S. Roper	11/15/80	8 31251 1
			SCALE
			SHEET 4 OF 18



DENISE IS PRETTY MUCH INTO VIDEO...

DATE	BY	REVISION	DESCRIPTION
11/13/85	...	1	...
11/13/85	...	2	...
11/13/85	...	3	...
11/13/85	...	4	...
11/13/85	...	5	...
11/13/85	...	6	...
11/13/85	...	7	...
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11/13/85	...	50	...

Commodore
C/AS500 Main Board
"Rock Lobster"
11/13/85



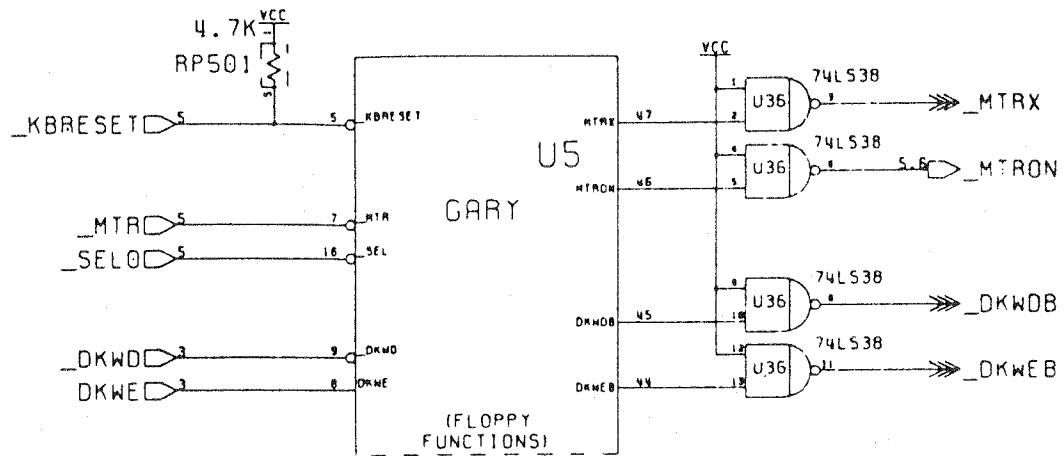
CENTRONICS

RS232

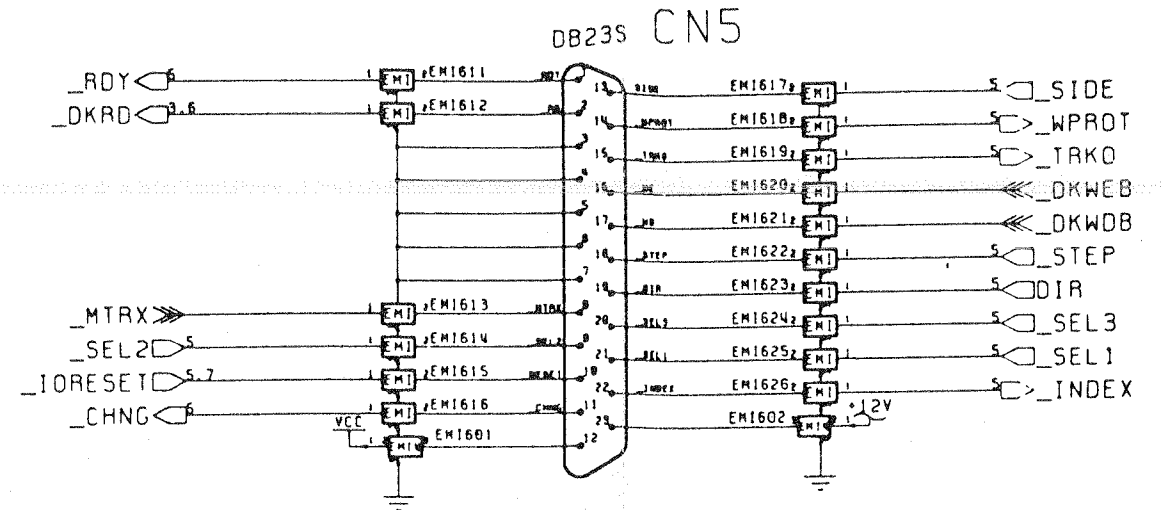
RS-232, CENTRONICS AND KEYBOARD

DATE	BY	REVISION
11/11/80
...

Commodore
C/AS66 Main Board
"Rock Labeler"
312511
SCALE 1/8" = 1"

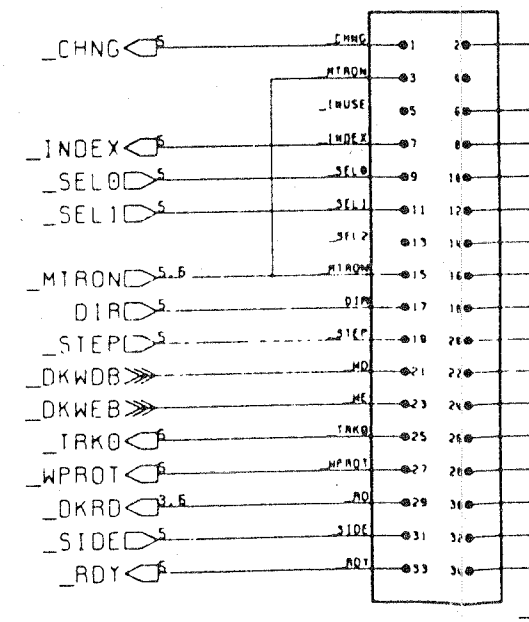


EXTERNAL FLOPPY



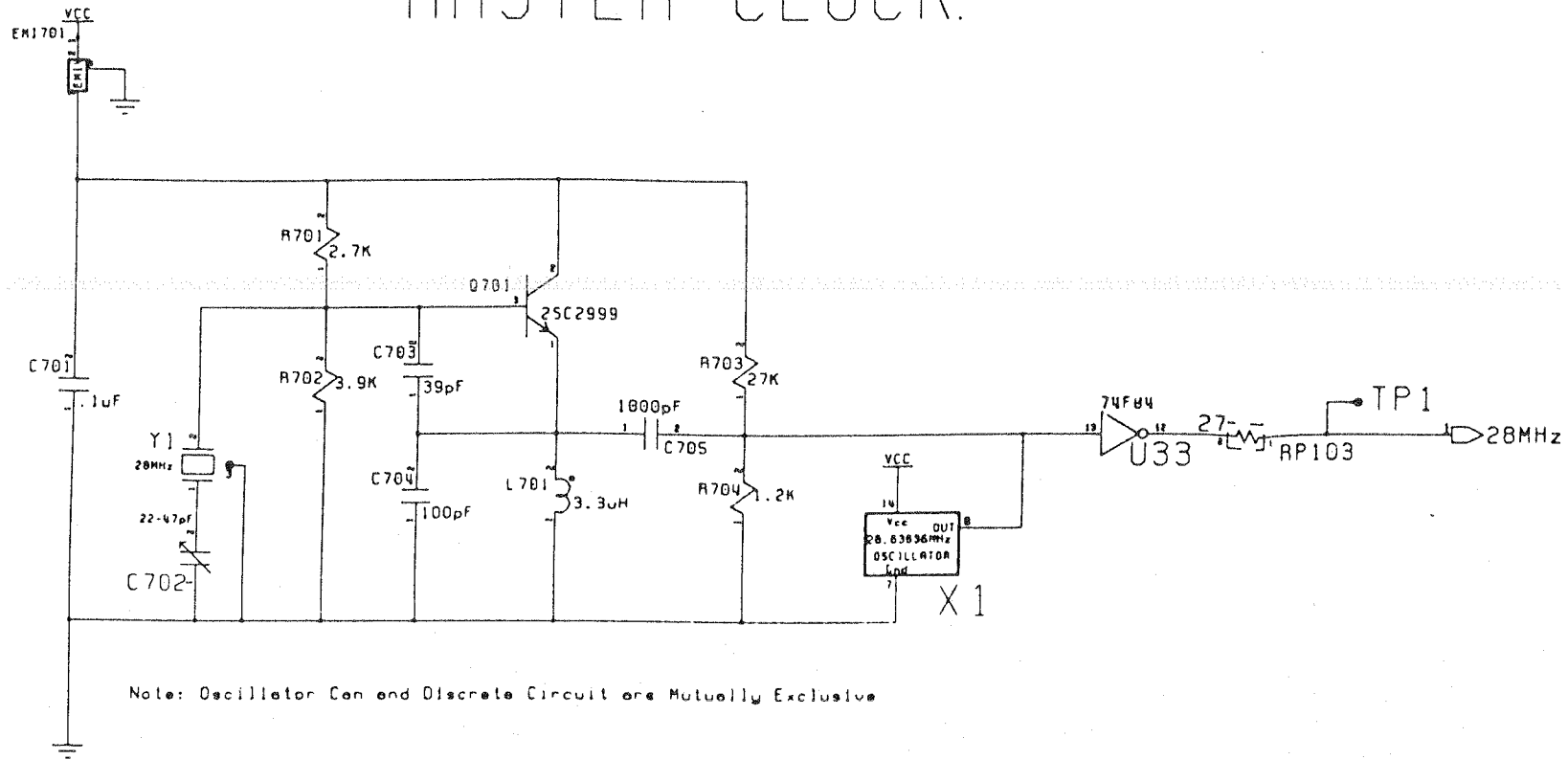
INTERNAL FLOPPY

CN11A/CN11B

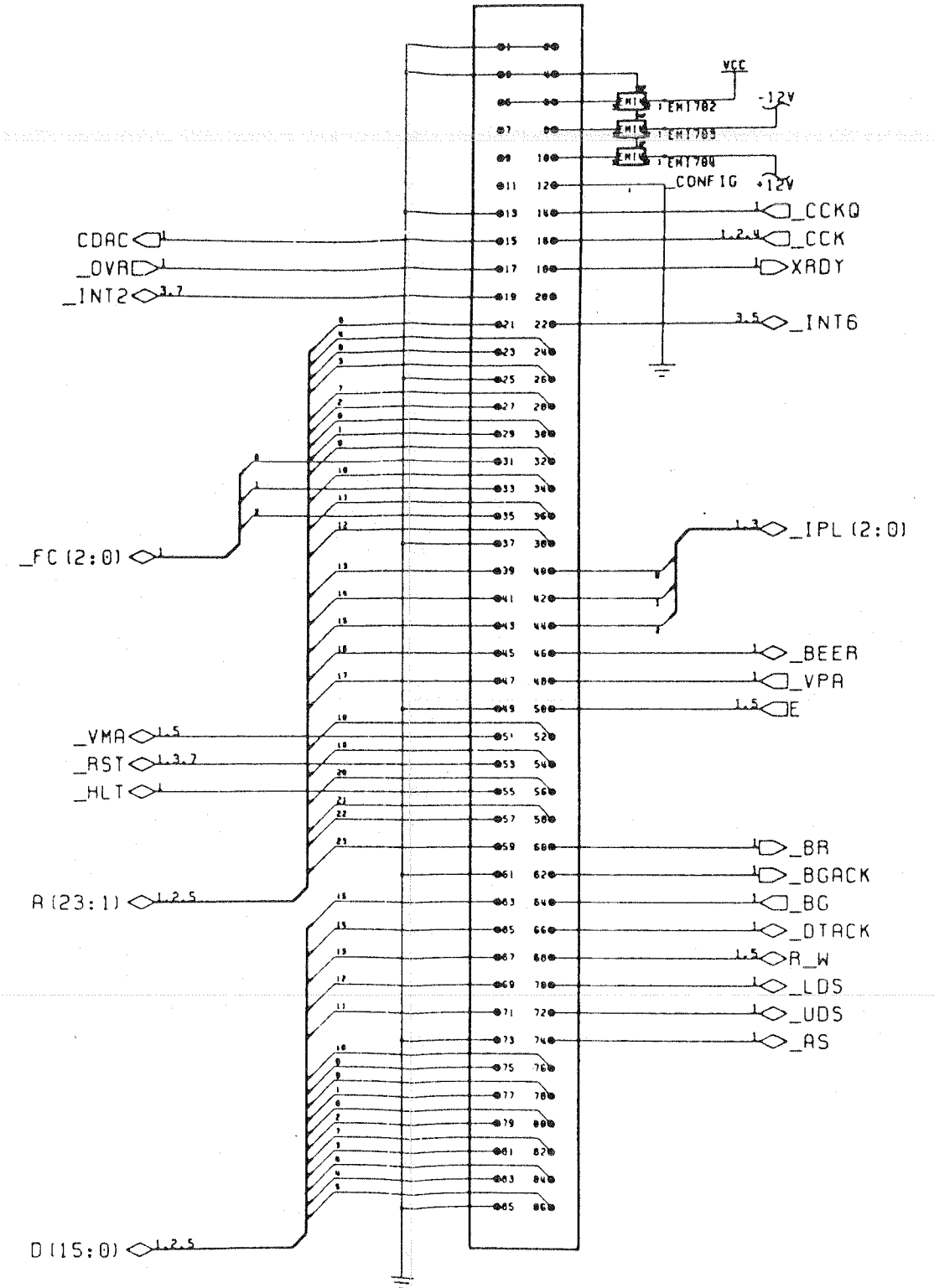


FLOPPY DISK INTERFACE AND CONNECTORS			
DATE	REVISION	BY	CHKD
11/13/88	1
Commodore			
C/ASB Main Board			
"Rock Labeler"			
3125	1	2	
SCALE			

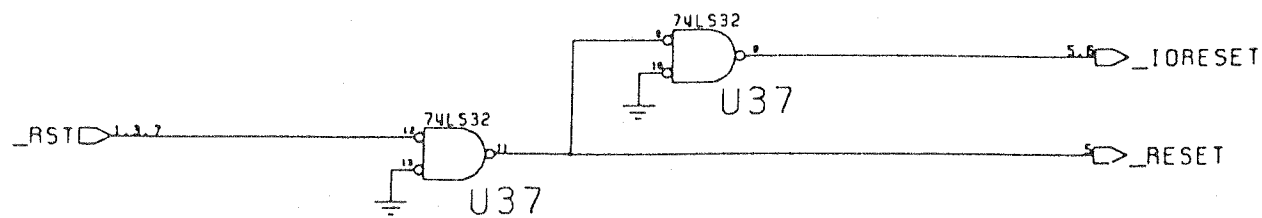
MASTER CLOCK.



EXPANSION P1A/P1B



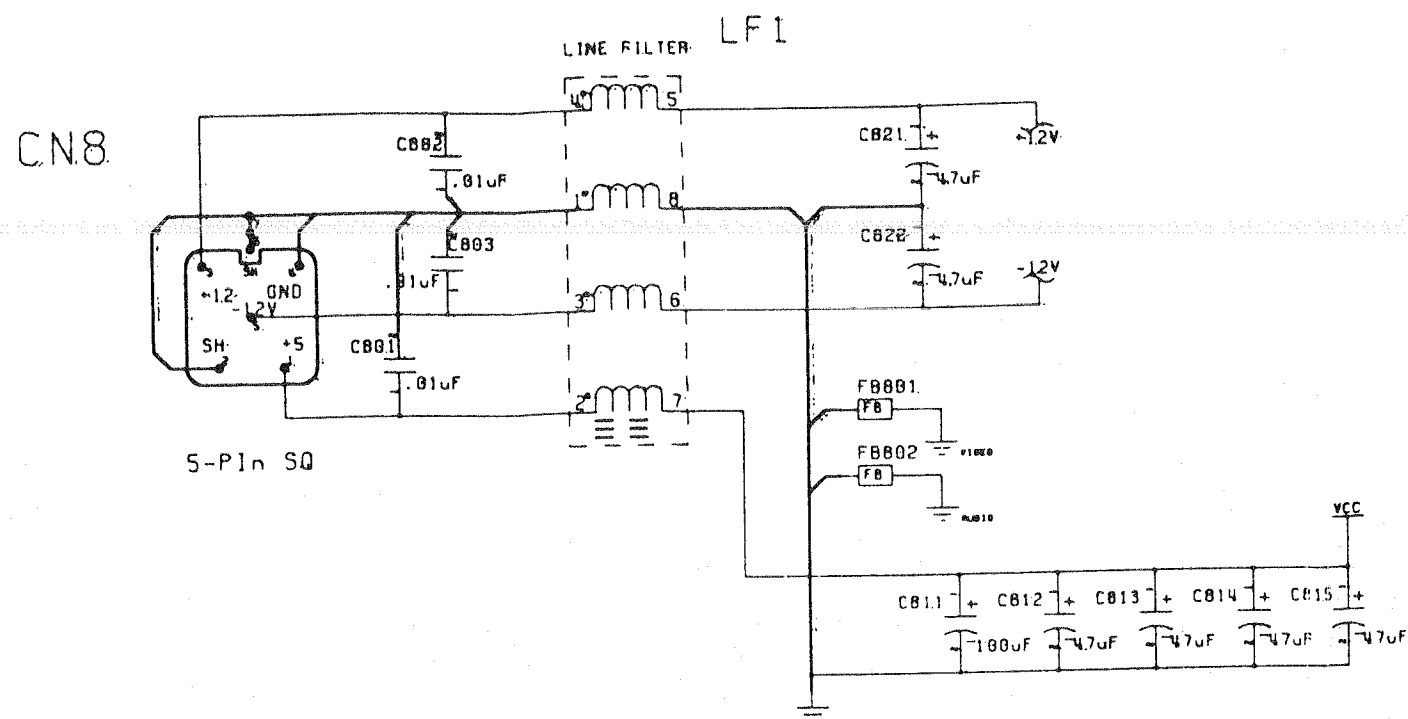
RESET ACTION



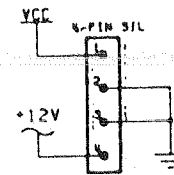
PART NUMBER		REV. NO.		DATE	
312511		1		1981	
Commodore					
C/RSDB Main Board					
"Rock Labeler"					
312511					
SCALE SHEET 8 OF 10					

POWER INPUT

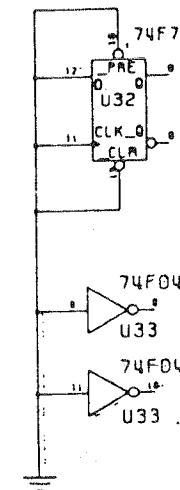
SPARES



FLOPPY POWER

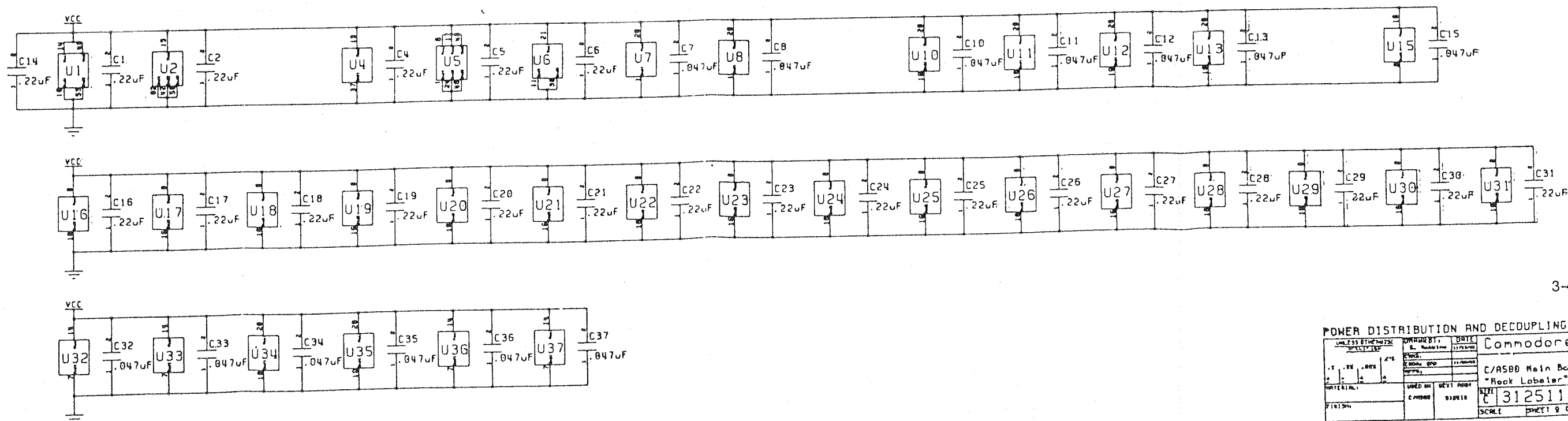


CN12



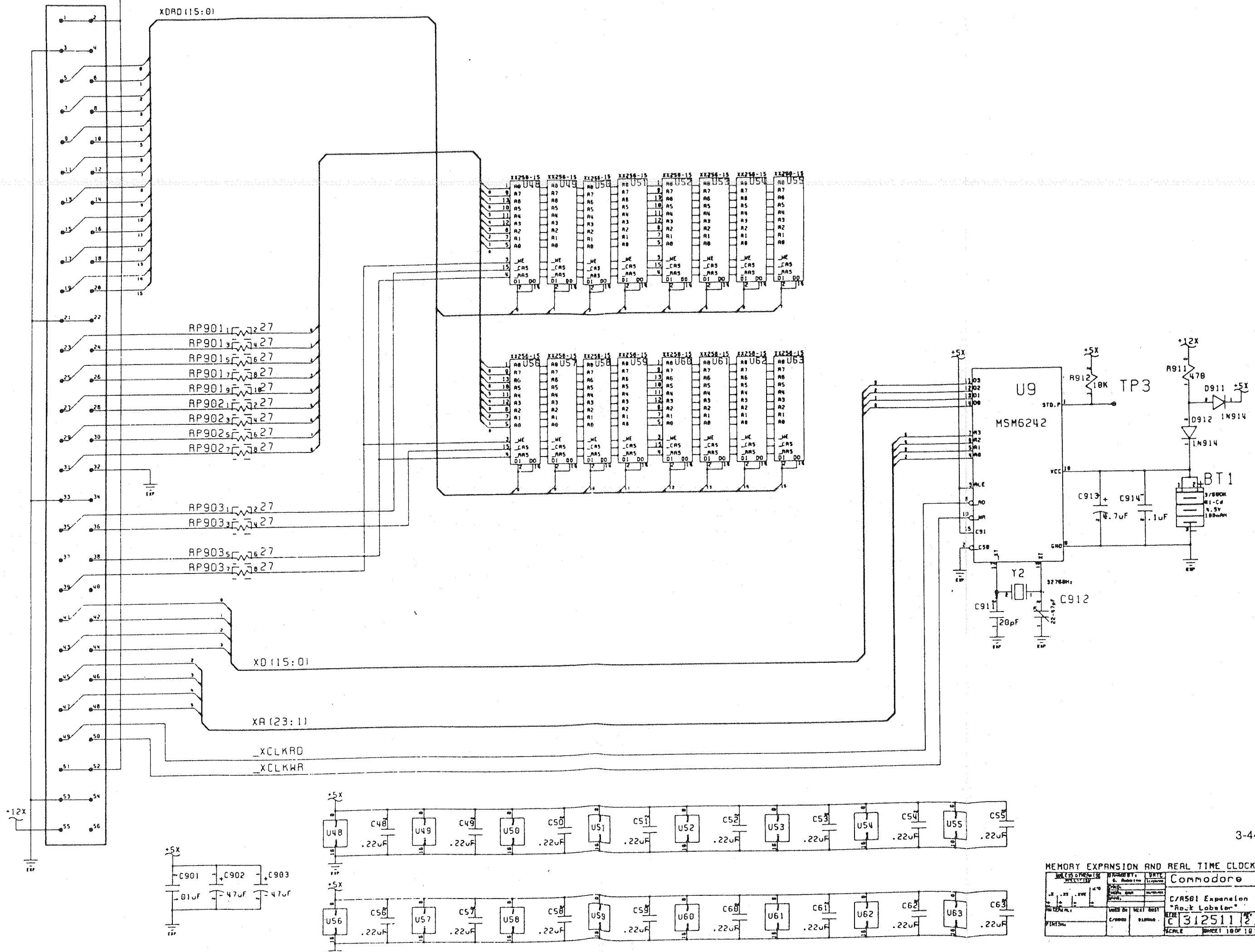
NOTE: HEAVY LINES INDICATE A SINGLE POINT CONNECTION

DECOUPLING



POWER DISTRIBUTION AND DECOUPLING			
DESIGNED BY	DATE	Commodore	
U.S. BY	DATE	C/ASBD Main Board	
MATERIAL	USED BY	"Rock Labeler"	
CAVENDISH	910010	312511	2
SCALE	SHEET 9 OF 10		

CNY/CNY1:5X



MEMORY EXPANSION AND REAL TIME CLOCK			
NO. OF CHIPS	MEMORY	TYPE	SCALE
8	64K	8K	100%
Comodore			
C/AS51 Expansion			
"Rock Labeler"			
C3125112			
SCALE DIRECT 100% 10			

REV	DESCRIPTION	DATE	APPROV	REVISION
1	Engineering Prototype	07/11/86	GRR	
2	Advanced Engineering Release	11/23/86	GRR	
3	Pilot Production Release (FTZ)	02/04/87	GRR	
4	Pilot Production Release (FCC)	01/01	GRR	
5	Pilot Production Release	05/04/87	GRR	5/11/87

Jumpers and Test Points

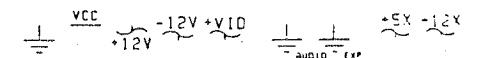
JP1 - System Reset vs. Keyboard Reset
 JP2 - Memory Expansion Address Select
 JP3 - Internal Memory Address Select

TP1 - 64 Hz Real-Time Clock Test Point

SIGNAL	DESCRIPTION
28MHZ	28.63636 MHz Master Clock
7MHZ	7 MHz Processor Clock
A[23:1]	Processor Address (68000)
ACK	Data Acknowledge (Parallel)
AS	Address Strobe (68000)
AUDIN	Audio Input (RS232 jack)
AUDOUT	Audio Output (RS232 jack)
BEER	Bus Error (68000)
BG	Bus Grant (68000)
BGACK	Bus Grant Acknowledge (68000)
BLISS	Blitter Slowdown (chips)
BLIT	Chip Memory Access (chips)
BR	Bus Request (68000)
BUSY	Device Busy (parallel)
CASL/CASU	CAS lower/upper byte (DRAM)
CCK	Color Clock aka C1 (chips)
CCKQ	Color Clock Quadrature aka C3 (chips)
CDAC	7 MHz Quadrature Clock
CHNG	Media Change (floppy)
CLKRD/CLKWR	Real-time Clock Read/Write
COMP	Composite Monochrome Video (video)
CSYNC	Composite Sync (video)
CTS	Clear to Send (rs232)
D[15:0]	Processor Data (68000)
DIR	Direction (floppy)
DKRD	Diskette Read Data (floppy)
DKWDB	Diskette Write Data (floppy)
DKWEB	Diskette Write Enable (floppy)
DMAL	Chip DMA Request (chips)
DR[8:0]	DRAM Address (DRAM, chips)
DRD[15:0]	DRAM Data (DRAM, chips)
DSR	Data Set Ready (rs232)
DTACK	Data Transfer Acknowledge (68000)
DTR	Data Terminal Ready (rs232)
E	Peripheral E Clock (68000)
EXRAM	Expansion Memory Present
FC[0:0]	Function Control (68000)
FIRE0/FIRE1	Fire Button (joysticks)
HLT	Processor Halt (68000)
HSYNC	Horizontal Sync (video)
INDEX	Diskette Index Hole (floppy)
INT[2,3,6]	Interrupt Requests (chips)
IORESET	I/O Reset
IPL[2:0]	Processor Interrupt Requests (68000)
KBCLOCK	Keyboard Clock (keyboard)
KBDATA	Keyboard Data (keyboard)
KBRESET	Keyboard Reset (keyboard)
LDS/UDS	Upper/Lower Data Strobe (68000)
LED	Power On LED

SIGNAL	DESCRIPTION
LEFT/RIGHT	Audio Channels
MTR	Motor On (floppy)
MTR0	Motor On Drive 0 (floppy)
MOV/MOH	Mouse Quadrature Signals (joysticks)
MIV/MIH	Mouse Quadrature Signals (joysticks)
OVR	Overlay ROM over RAM
OVR	Override System Decoding
PIXELSW	Pixel Switch (video)
POTOX/POTOY	Pot Lines (joysticks)
POTIX/POTIY	Pot Lines (joysticks)
POUT	Paper Out (parallel)
PPD[7:0]	Parallel Port Data (parallel)
RAMEN	RAM Enable (chips)
REGEN	Chip Register Enable (chips)
RAS0/RAS1	RAS Internal/Expansion Lines (DRAM)
RDY	Drive Ready (floppy)
RESET	General Reset
RGA[8:1]	Register Address Bus (chips)
RI	Ring Indicate (rs232)
ROMEN	ROM Enable
RTS	Request to Send (rs232)
RST	Processor Reset (68000)
RXD	Receive Data (RS232)
RW	Processor Read/Write (68000)
SEL	Select (parallel)
SEL[3:0]	Drive Select (floppy)
SIDE	Side Select (floppy)
STEP	Head Step Command (floppy)
TRK0	Track 0 Sense (floppy)
TXD	Transmit Data (RS232)
VMA	Valid Memory Address (68000)
VPA	Valid Peripheral Address (68000)
VSYNC	Vertical Sync (video)
WE	Write Enable (DRAM)
WPROT	Write Protect Sense (floppy)
XCLK	External 28 MHz Clock (genlock)
XCLKEN	External Clock Enable (genlock)
XRDY	External Data Ready

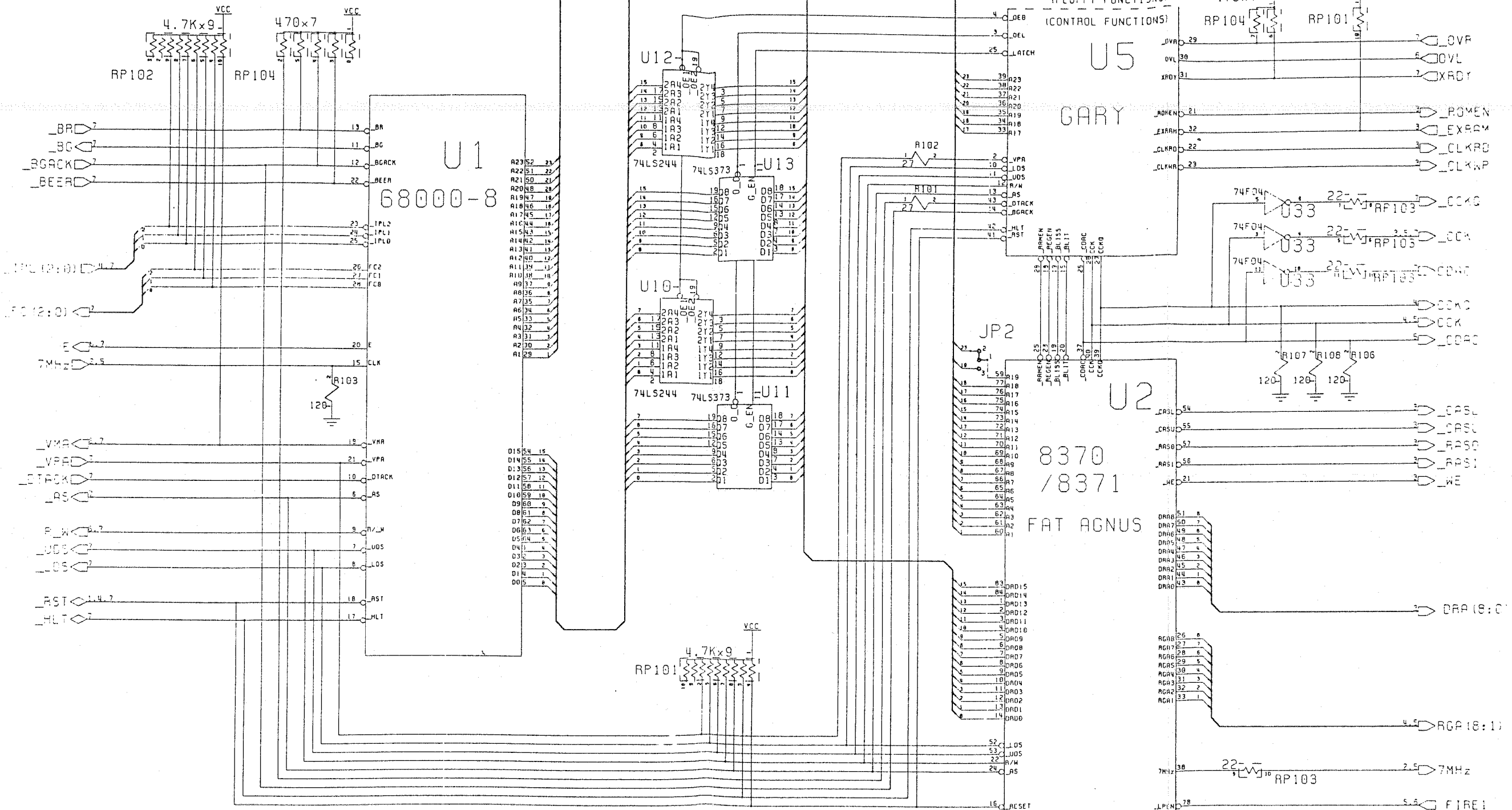
ATTEMPT TO FORCE NODE NUMBERS VIA SEQUENCE



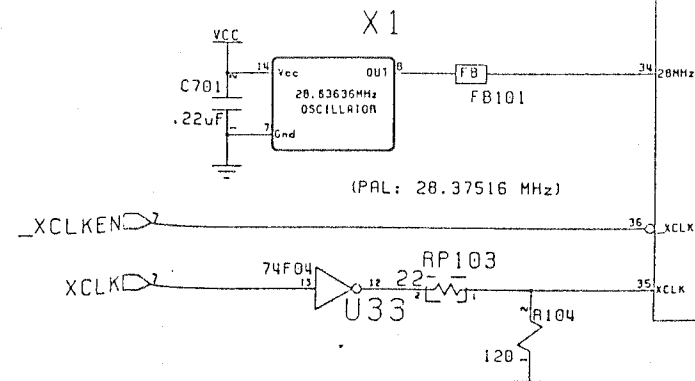
A PAGE FOR SHARON AND VONNIE TO USE

DRAWN BY: G. Robinson	DATE: 11/23/86	COMPANY: Commodore
DESIGNED BY: GRR	DATE: 11/23/86	PROJECT: C/AS00 Main Board
USED ON: C/AS00	NEXT ASSY: 31/2518	SIZE: 21312511
SCALE: 1:1		

Note: R103-104, 106-108 are from EMI control and may not be loaded in all cases
 JP2 controls where expansion ram maps to:
 A23 -> C00000 (default), A19 -> 080000



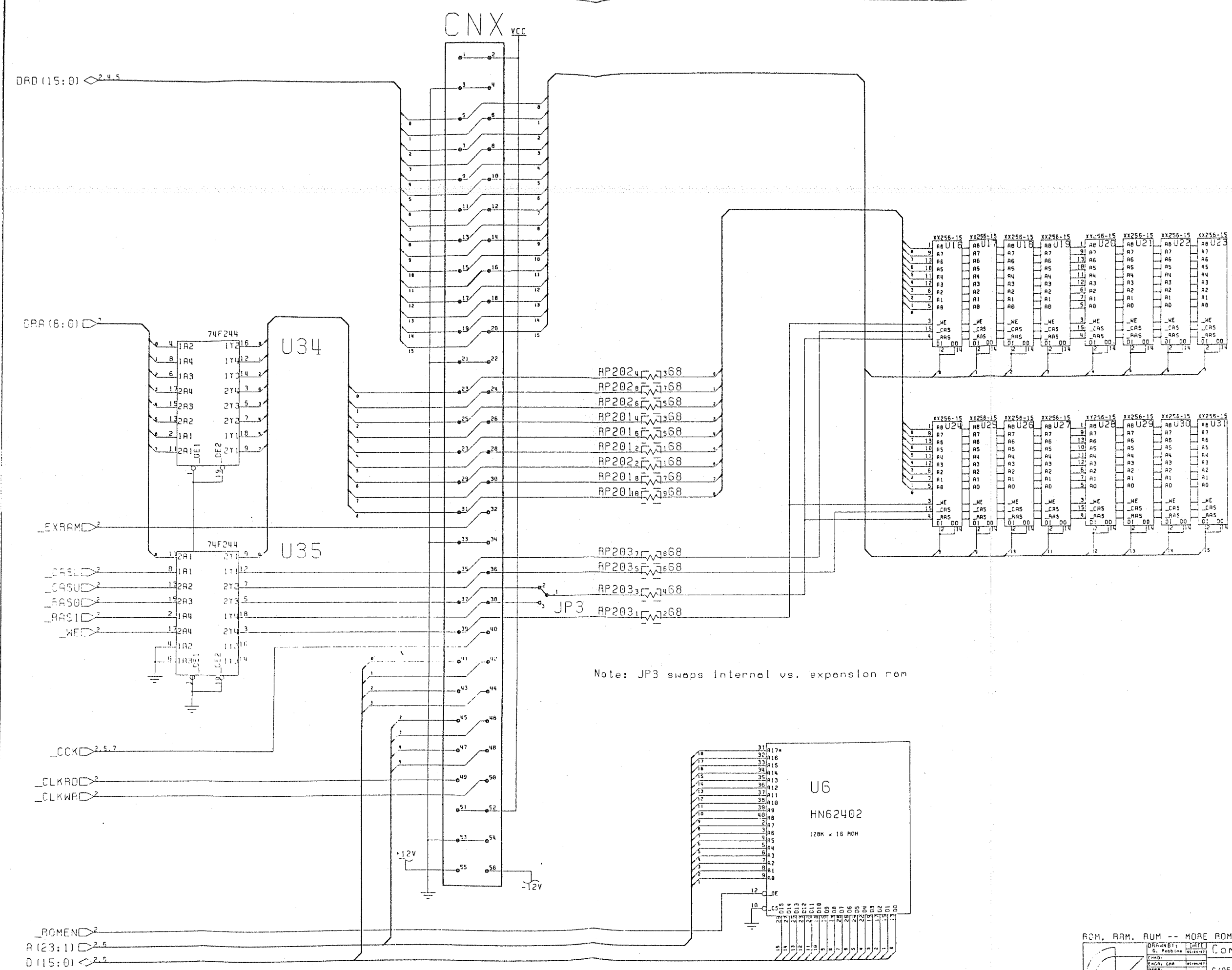
Rock Lobster
 05/04/86




PROCESSOR AND OTHER USEFUL COMPONENTS

DRAWN BY: G. Robbins	DATE: 11/85	PROJECT: 312511
ENCL: CPU	REV: 1	SCALE: 1:1
APPN: 1/8800	WEST ASST: 312511	SHEET 2 OF 2

CONNODRE
 C/ASCO Main Board
 "Rock Lobster"

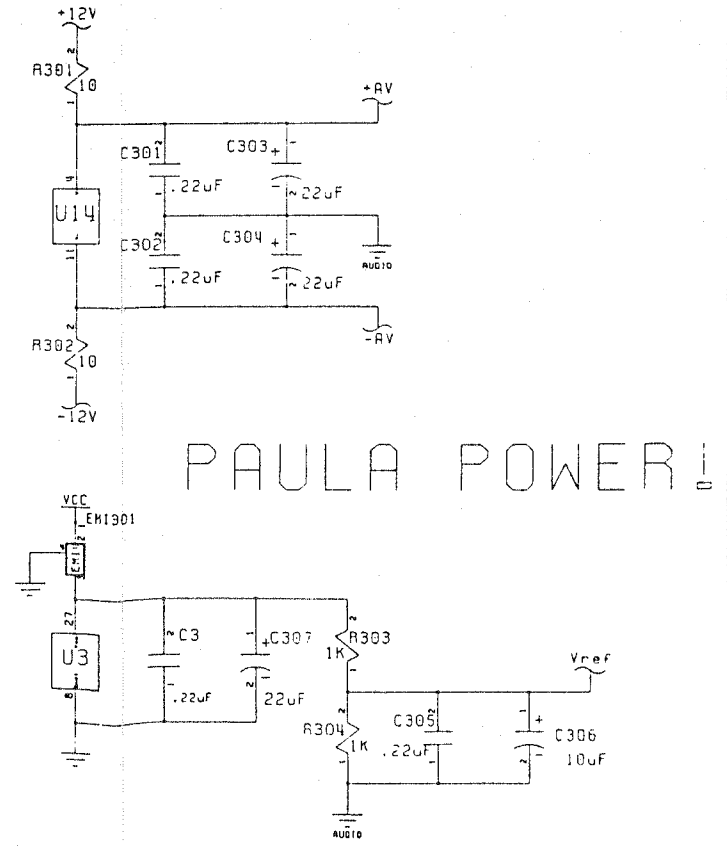
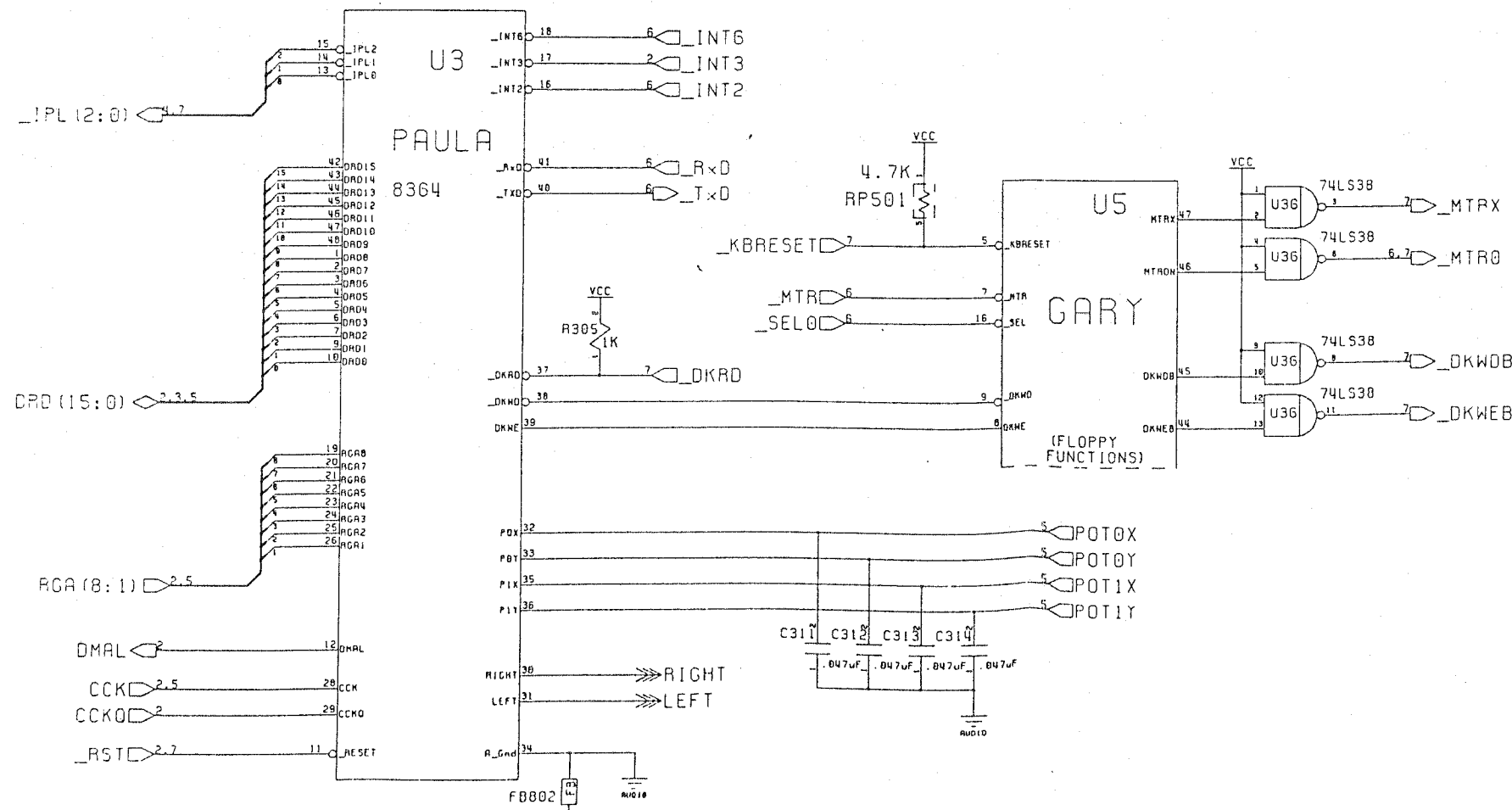
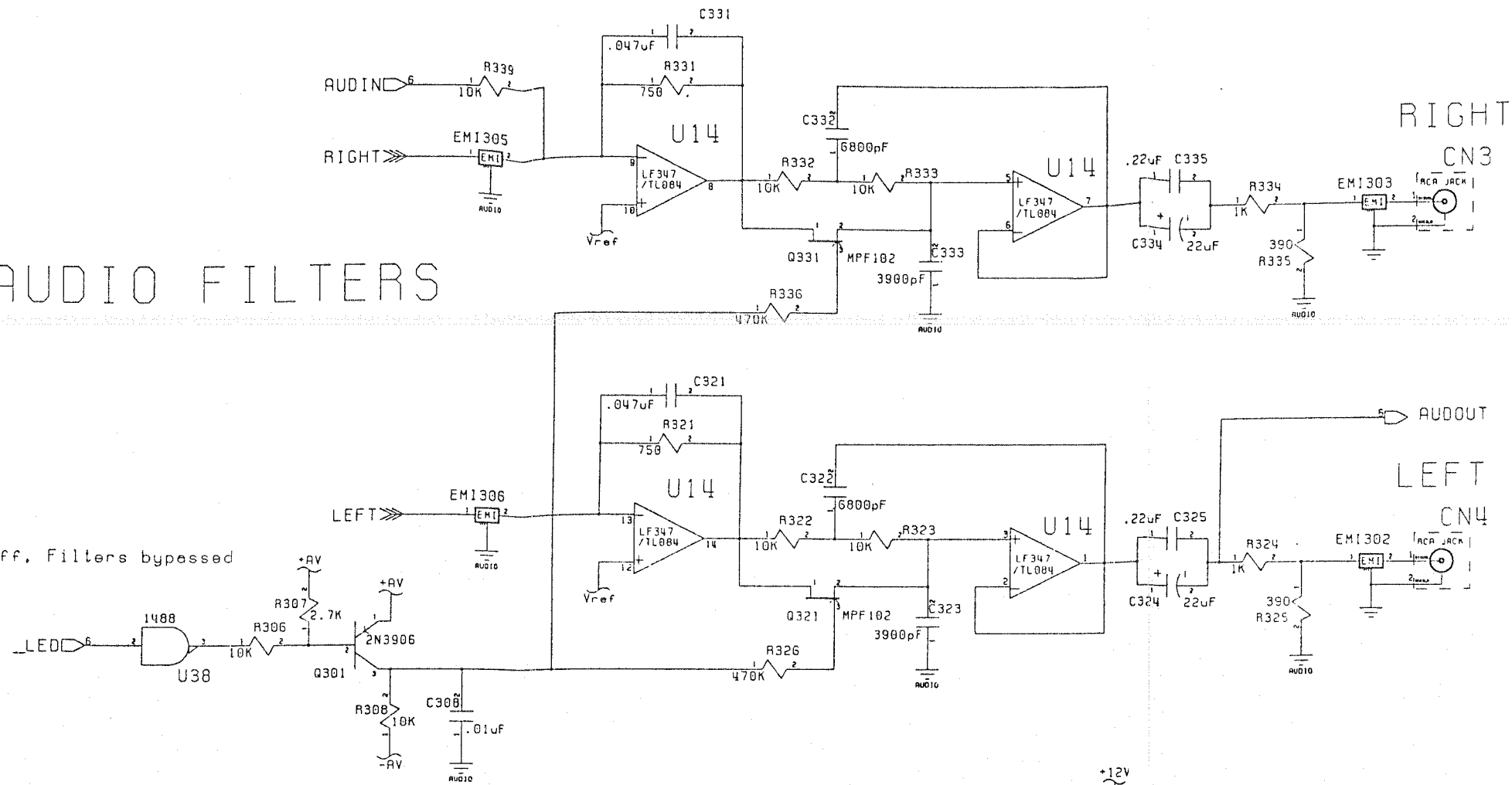


Note: JP3 swaps internal vs. expansion rom

ROM, RAM, ROM -- MORE ROM, RAM, ROM!		Commodore	
	DRAWN BY: G. Robbins ENGR. CNA APPR.: USED ON: C/A500 DATE: 3/25/80	PROJECT: C/A500 Main Board "Rock Lobster" SIZE: 11x17 SCALE: 1:1	REV: 1 DATE: 3/25/80

AUDIO FILTERS

Note: LED off, Filters bypassed

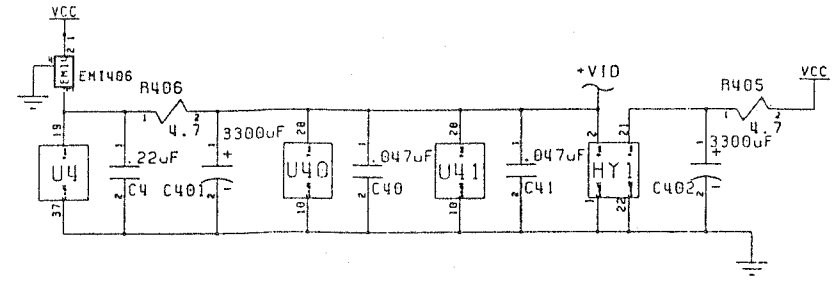
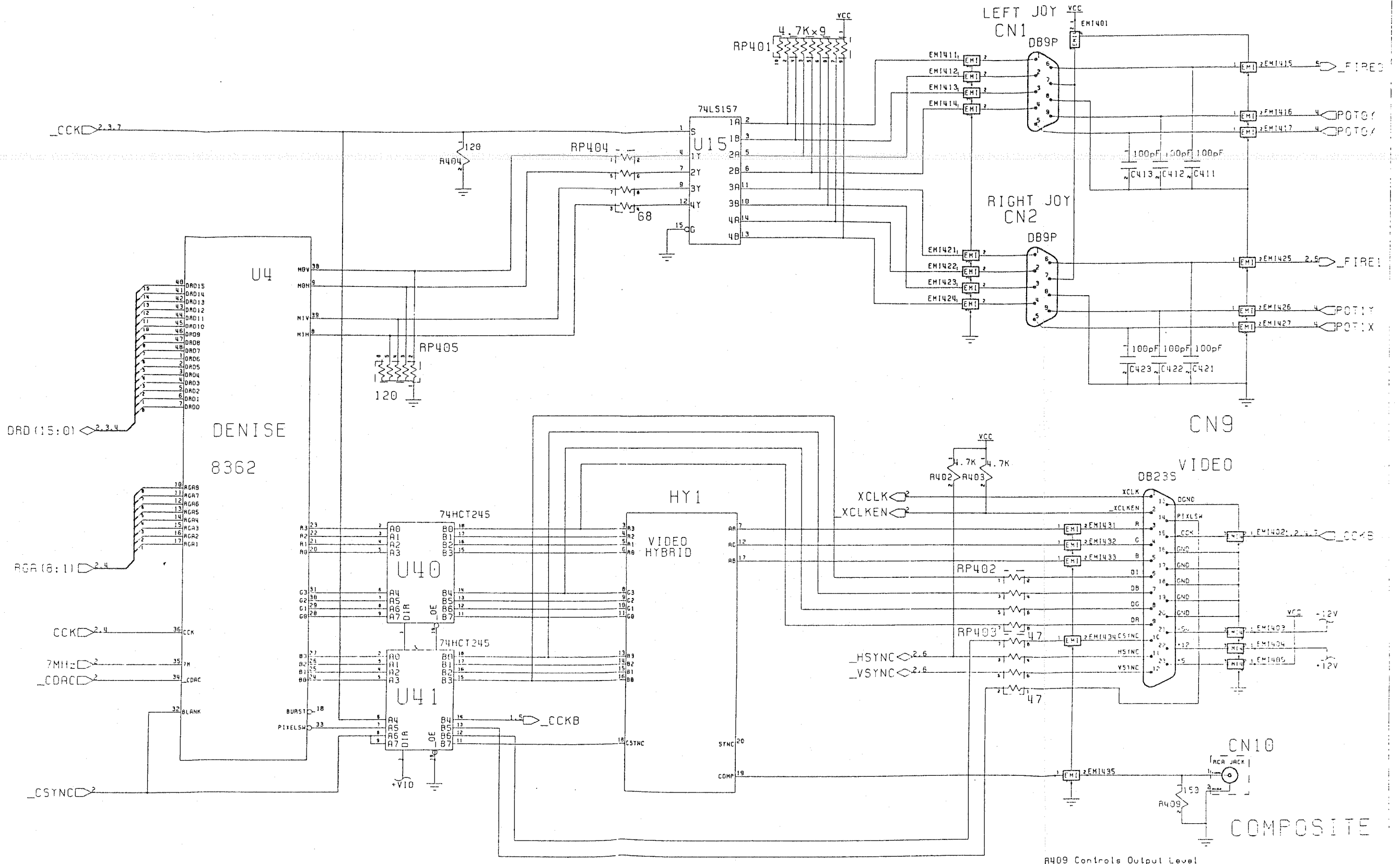


Note: Ground connection at Audio jacks

PAULA DOES THINGS THAT DENISE DOESN'T

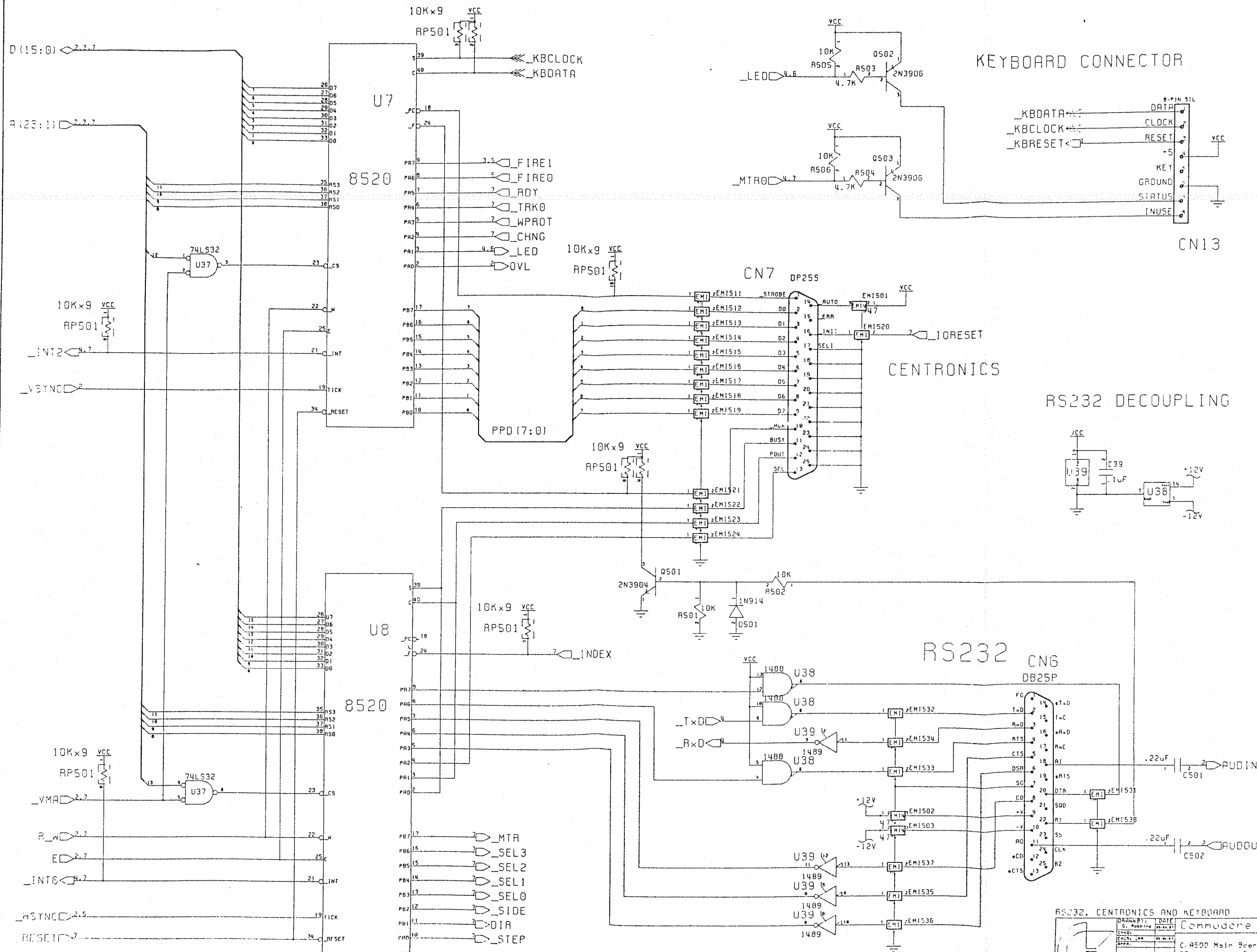
DESIGNED BY	DATE	Commodore	
G. Robline	02/82		
CARD			
ENGR. CMR	01-82	C/A500 Main Board	
PROF.		"Rock Lobster"	
USED ON	NEXT ASSY	SIZE	REV
C-9500	312510	C 312511	1
SCALE	SHEET 4 OF 3		

note: EM1401 is loaded with 4.7 Ohm Resistor



DENISE IS PRETTY MUCH INTO VIDEO...

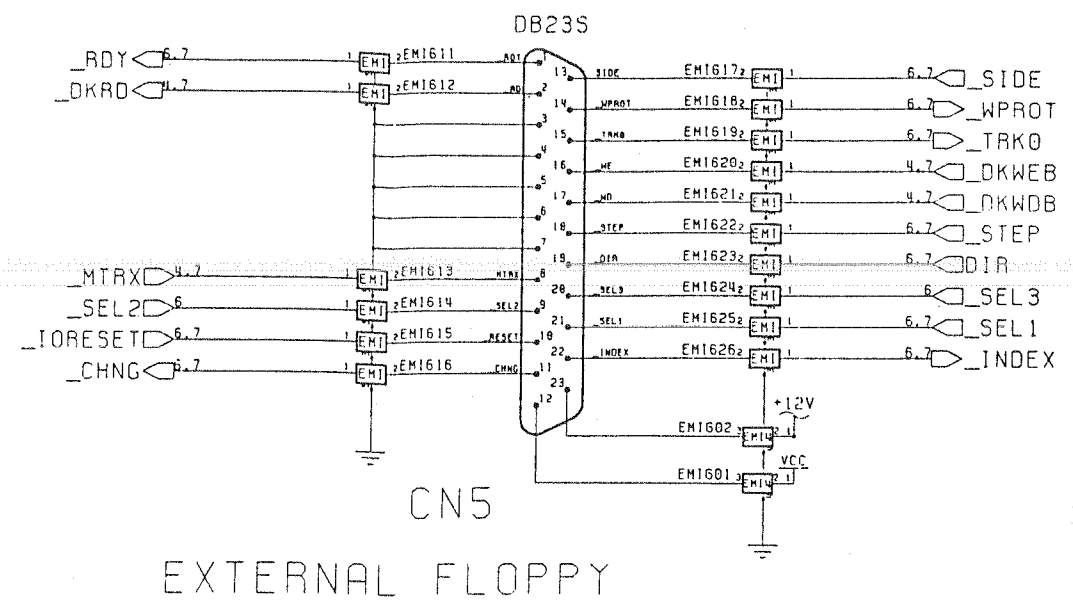
DATE	DATE	Commodore
DESIGNER	BY	C/A500 Main Board
APP'D	BY	"Rock Lobster"
USED ON	NET#	312511
C/A500	312510	312510



Note: EM1501-503 are loaded with 47 Ohm 1/2 W resistors

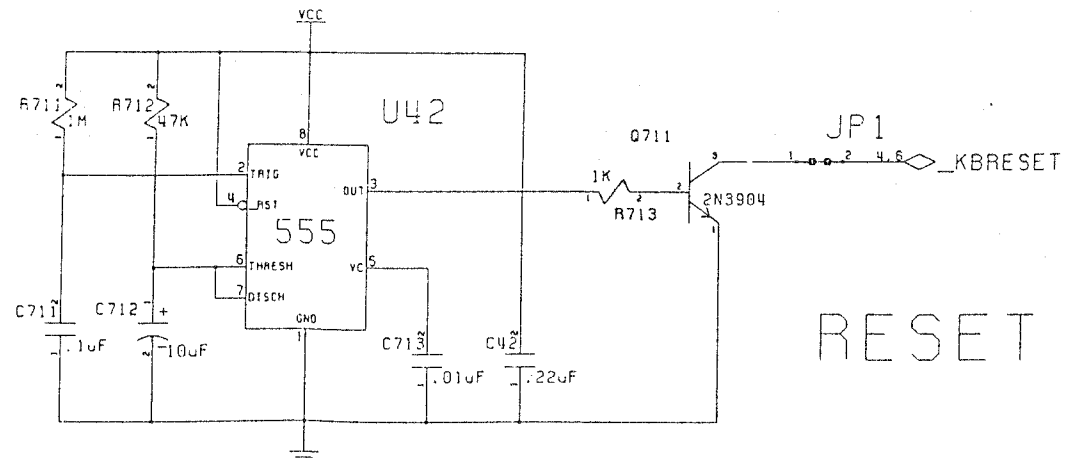
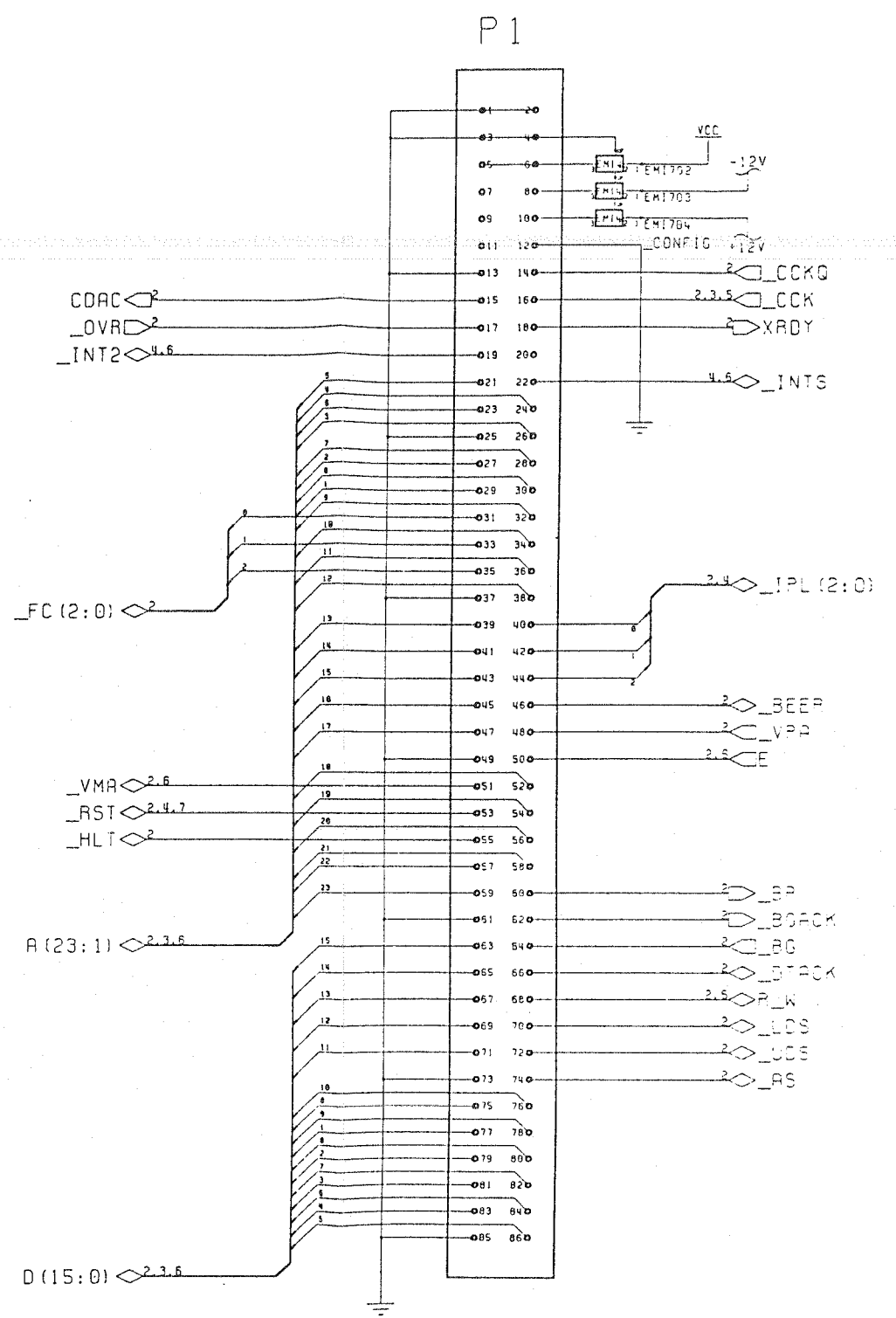
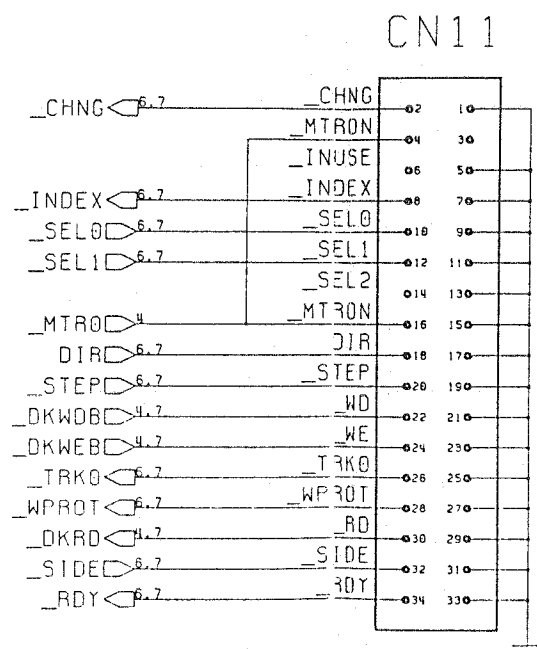
RS232, CENTRONICS AND KEYBOARD		DATE	
DRAWN BY	C. R. 500	DATE	Commadore
CHKD BY		REV	
APP'D		USED ON	C. R. 500 Main Board
DESIGN		WEIT ASSY	"Rock Lobster"
C. R. 500	312518	SIZE	C 312511 5
		SCALE	SHEET 5 OF 9

EXPANSION

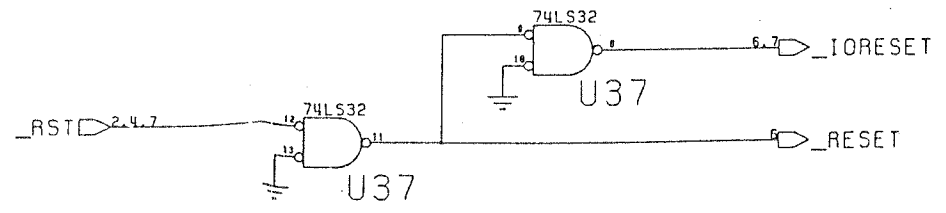


EXTERNAL FLOPPY

INTERNAL FLOPPY



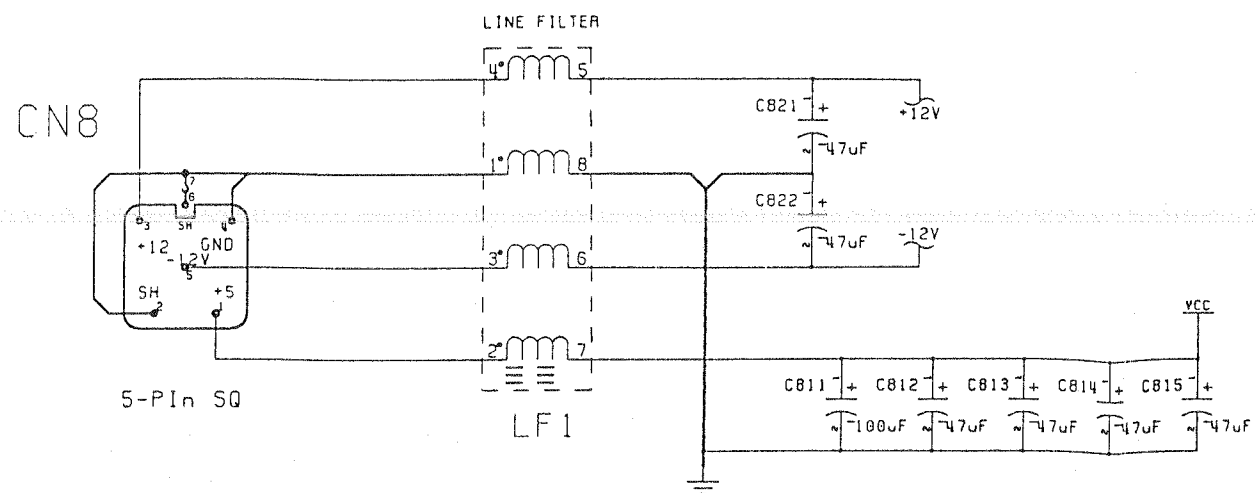
RESET ACTION



FLOPPY DISK AND EXPANSION CONNECTORS

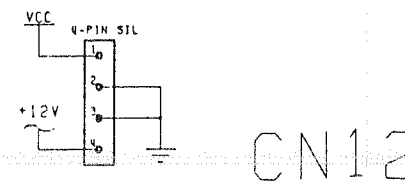
DATE	DESIGNED BY	DATE	DESIGNED BY
11/18/81	J. H. HARRIS	11/18/81	J. H. HARRIS
CHKD BY	APPR BY	CHKD BY	APPR BY
USED ON	NEXT ASST	FILE	
C/A530	312510	4131251113	
Commodore			
C/A500 Main Board "Roxie Lobster"			

POWER INPUT

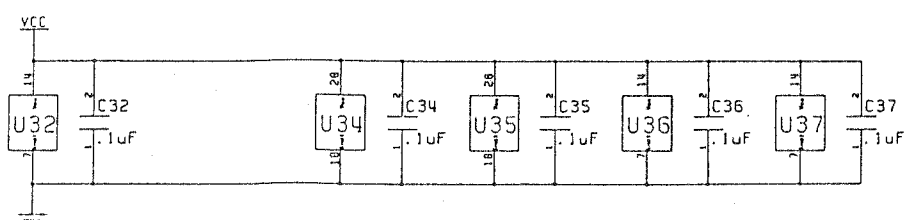
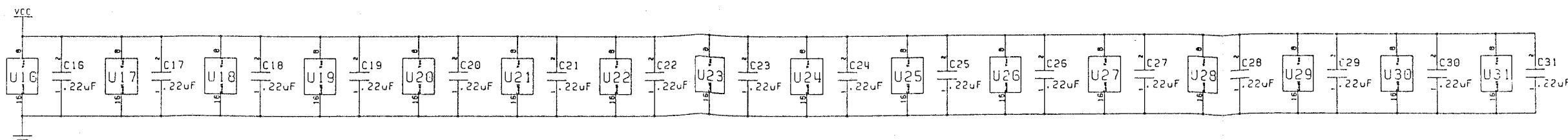
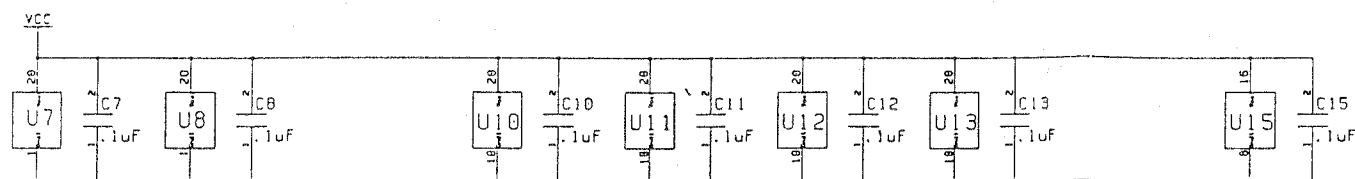
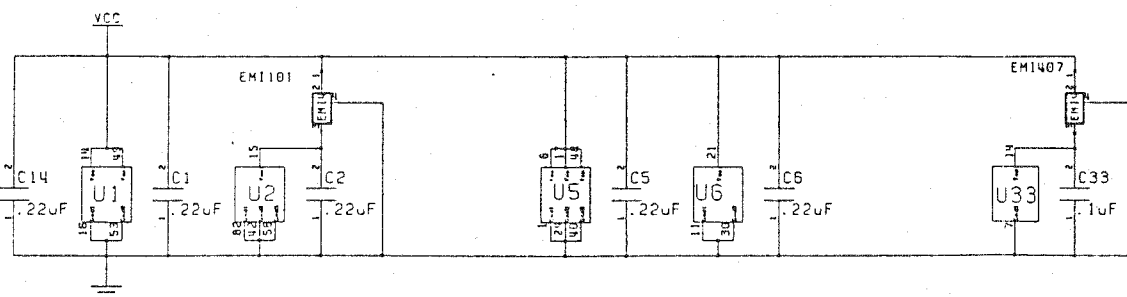
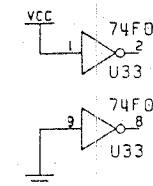


NOTE: HEAVY LINES INDICATE A SINGLE POINT CONNECTION

FLOPPY POWER

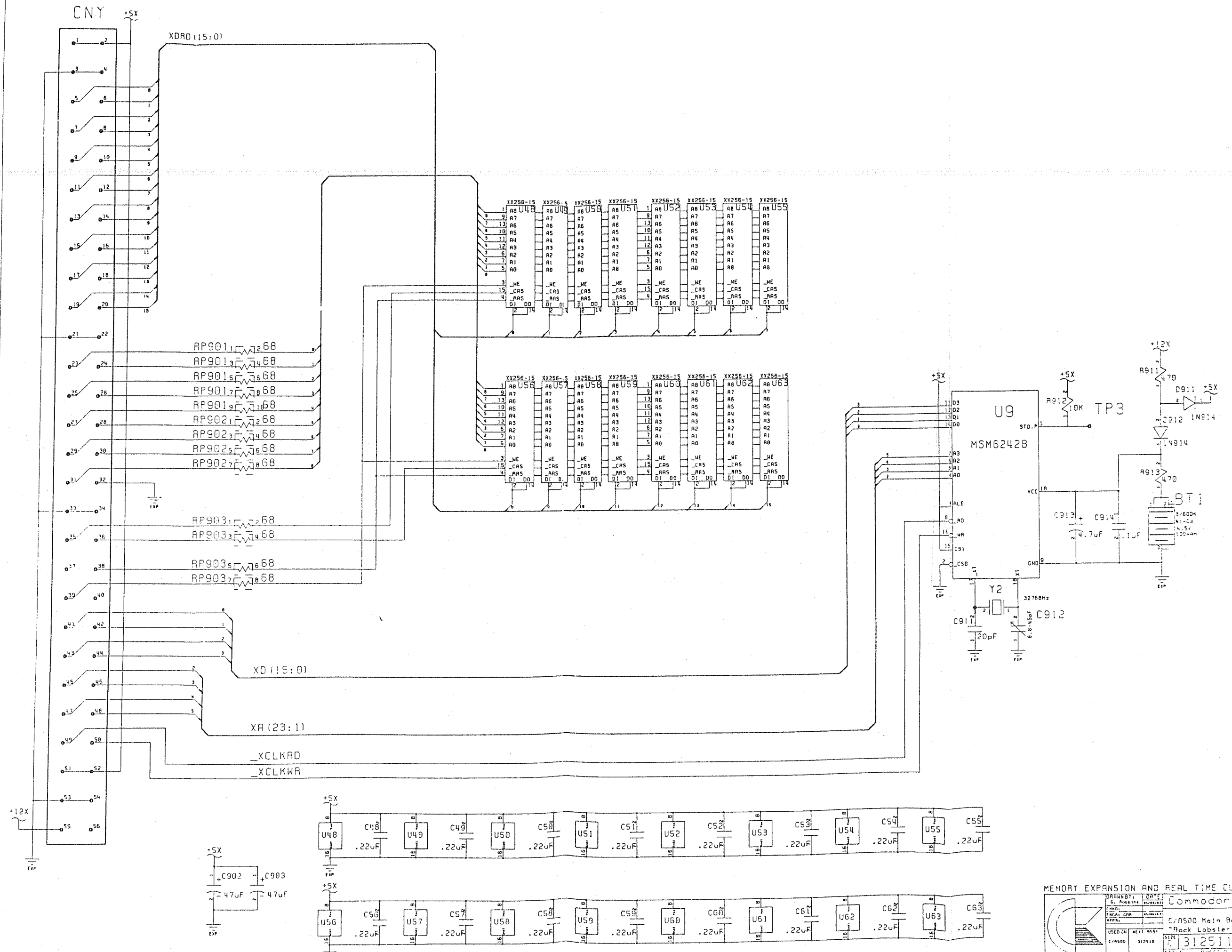


SPARES



DECOUPLING

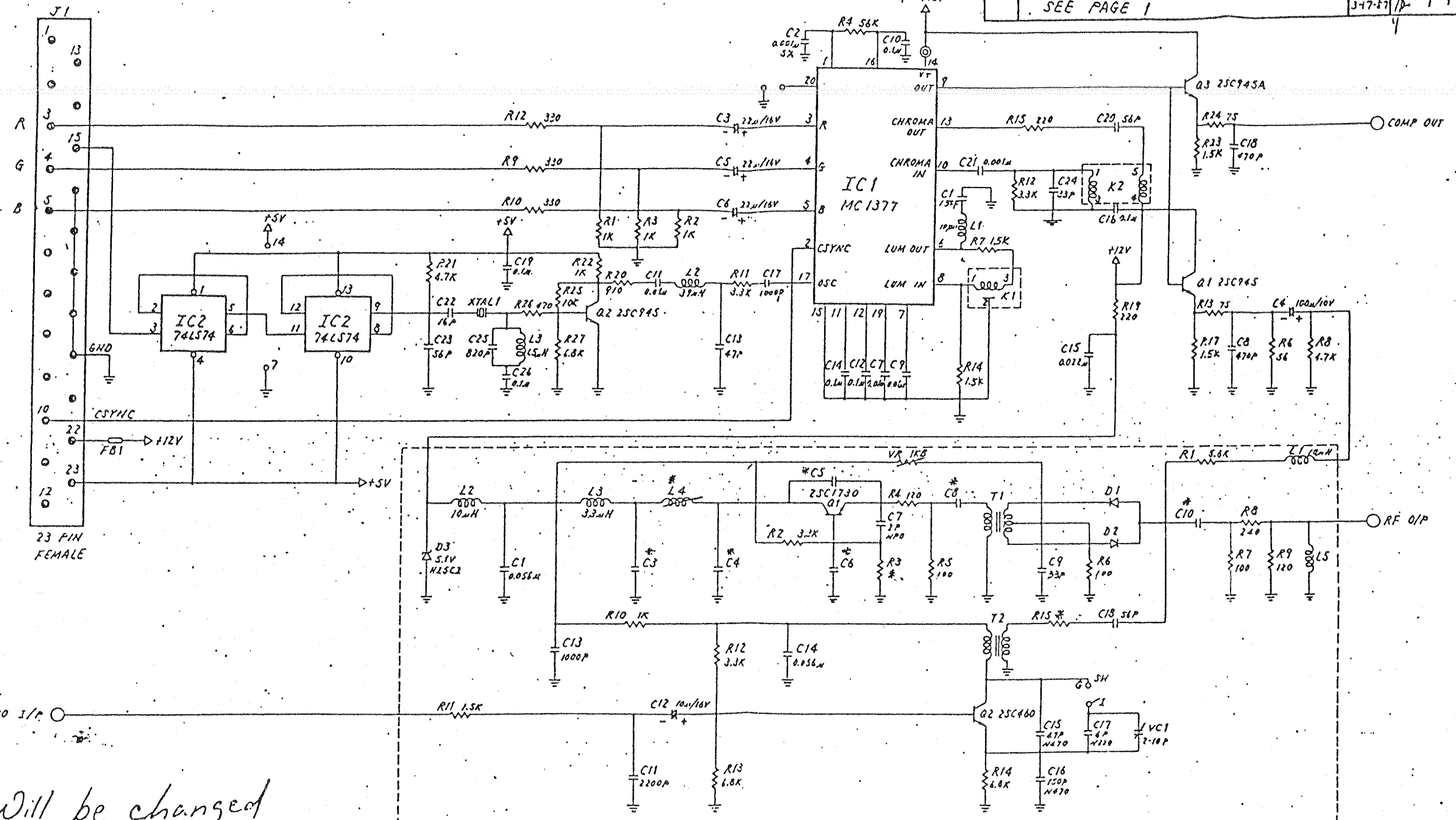
POWER DISTRIBUTION AND DECOUPLING			
DESIGNED BY G. Robbins	DATE 12/15/81	Commodore	
ENGR. CNA	REV. 1.1	C/AS50 Main Board "Rock Lobster"	
US10 ON	RELT ASST	SIZE C 312511 15	REV 1.1
C/AS50	312510	SCALE	SHEET 8 OF 9



MEMORY EXPANSION AND REAL TIME CLOCK

DRAWN BY:	DATE:	Commodore
CHKD BY:	REV:	
ENGR. CNA:	APP'D:	
USED ON:	NET ASST:	
C/AS50	312510	131251113
SCALE:	SHEET:	2 of 4

REVISIONS			
LTR.	DESCRIPTION	DATE	APPROVED
	SEE PAGE 1	J-17-87	[Signature]



Will be changed shortly via ECO

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UNLESS OTHERWISE SPECIFIED, TOLERANCES ON DECIMALS ARE:	DRAWN BY: [Signature]	DATE: 1-17-87
X .1	CHECKED BY: [Signature]	1-17-87
R .5	ENG APPR: [Signature]	1-17-87
B 1	APPR: [Signature]	1-17-87
FINISH	USED ON: AS20	NEXT ASSY:

CETL NO: 52A013
COMMODORE (INVAR)
SCHEMATIC, AS20 PAL
SIZE C 355205 REV A
SCALE NONE SHEET 2 OF 2

PART NO.	DESCRIPTION
312510-01	A500 REV3 PCB ASSY NTSC (INACTIVE)
312510-02	A500 REV3 PCB ASSY PAL (INACTIVE)
312510-03	A500 REV4 PCB ASSY NTSC (INACTIVE)
312510-04	A500 REV4 PCB ASSY PAL (INACTIVE)
312510-05	A500 REV5 PCB ASSY NTSC
312510-06	A500 REV5 PCB ASSY PAL

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
4		PILOT PRODUCTION RELEASE	4-27-87	J. Porter
5		REVISED PER ECO 870180	7-6-87	R-Buckner
6		REVISED PER ECO 870257	9-4-87	R-Buckner
7		REVISED PER ECO 870302	10-5-87	R-Buckner
8		REVISED PER ECO 870339	10-29-87	R-Buckner
A		REVISED PER ECO 870313	12-1-87	R-Buckner
B		REVISED PER ECO 870478	3-16-88	R-Buckner
C		REVISED PER ECO 880011	3-24-88	R-Buckner

1. SHEET 6 OF 6 SIZE C
 ASSY DWG
 NOTES:

CENTENNIAL BLUEPRINT N39044

commodore	TITLE: A500 PCB ASSEMBLY	DRAWN BY: J. PORTER	DATE	ENGR: <i>J.P.</i>	4-5-87	SIZE B	DRAWING NUMBER 312510
		CHKD:		APPR: <i>J.P.</i>			

QUANTITY REQD PER PART / DASH NO.							ITEM	DS	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES
06	05	04	03	02	01								
R	R	R	R	R	R	1	C	312511-01	SCHEMATIC				
R	R	R	R	R	R	2	D	312512-01	FABRICATION DRAWING				
-	-	-	-	1	1	3	C	312513-01	ARTWORK REV 3 (INACTIVE)				
-	-	1	1	-	-	4	C	312513-02	ARTWORK REV 4 (INACTIVE)				
1	1	-	-	-	-	5	C	312513-03	ARTWORK REV 5				
						6							
1	1	1	1	1	1	7	E	390084-03	IC, MCGROCC, 8MHz	U1			
0	1	0	1	0	1	8	A	318070-01	IC, FAT AGNUS, 8370 R3 NTSC	U2			
1	0	1	0	1	0	9	A	318071-01	IC, FAT AGNUS, 8371 R1, PAL	U2			
1	1	1	1	1	1	10	B	252127-02	IC, PAULA, 8364 R7	U3			
1	1	1	1	1	1	11	E	252126-02	IC, DENISE, 8362 R8	U4			
1	1	1	1	1	1	12		318072-01	IC, GARY, 5719	U5			
2	2	2	2	2	2	13	A	318029-02	IC, 8520R4	U7, U8			
1	1	1	1	1	1	14	A	315093-01	IC, RCM, KICKSTART V1.2	U6			TO BE PROGRAMMED ONTO 315094
16	16	16	16	16	16	15	A	390226-01	IC, 256K X 1 BIT DYNAMIC RAM	U16 - U31			
S	S	S	S	S	S	16	A	380223-01	IC, 256K X 1 BIT DYNAMIC RAM	U16 - U31			SUBSTITUTE FOR LINE 15
1	1	1	1	1	1	17	A	901882-01	IC, 1488	U38			
1	1	1	1	1	1	18	A	901883-01	IC, 1489	U39			
1	1	1	1	1	1	19	A	390086-01	IC, LF3A7/TL084	U14			
1	1	1	1	1	1	20	A	390110-01	IC, 74F04	U33			
1	1	1	1	1	1	21	B	901521-31	IC, 74LS32	U37			
1	1	1	1	1	1	22	B	901521-38	IC, 74LS38	U36			
0	0	0	0	1	1	23	A	390081-01	IC, 74F74	U32			
1	1	1	1	1	1	24	B	901521-11	IC, 74LS157	U15			
2	2	2	2	2	2	25	A	318050-01	IC, 74F244	U34, U35			
2	2	2	2	2	2	26	B	901521-13	IC, 74LS244	U10, U12			
2	2	2	2	2	2	27	A	310053-01	IC, 74HC245	U40, U41			
2	2	2	2	2	2	28	B	901521-29	IC, 74LS373	U11, U13			
1	1	1	1	1	1	29	E	901523-01	IC, NE555	U42			
S	S	S	S	S	S	30	A	252126-01	IC, DENISE 8362 R6	U4			SUBSTITUTE FOR LINE 11
S	S	S	S	S	S	31		380223-05	IC DRAM 256K X 1 80 NS				SUBSTITUTE FOR ITEM 15
1	1	1	1	1	1	32	B	252167-01	DIN, 5PIN, SQUARE, FEMALE	CN8			POWER
2	2	2	2	2	2	33	A	390242-01	D-SUB, 9PIN, MALE, RA, SOLDER-IN	CN1, CN2			JCYETICK WITHOUT JACKPOST
1	1	1	1	1	1	34	A	390242-03	D-SUB, 23PIN, MALE, RA, SOLDER-IN	CN9			VIDEO WITHOUT JACKPOST
1	1	1	1	1	1	35	A	390241-03	D-SUB, 23PIN, FEMALE, RA, SOLDER-IN	CN5			DISK DRIVE WITHOUT JACKPOST
1	1	1	1	1	1	36	A	390242-05	D-SUB, 25PIN, MALE, RA, SOLDER-IN	CN6			RS232 WITHOUT JACKPOST
1	1	1	1	1	1	37	A	390241-05	D-SUB, 25PIN, FEMALE, RA, SOLDER-IN	CN7			CENTRONICS WITHOUT JACKPOST

Commodore

TITLE: A500 PCB ASSEMBLY

DRWN BY: J. PORTER
CHKD:

DATE: ENGR: J. Porter
DATE: APPR:

SIZE: B
312510

REV: C
SHT: 2/6

QUANTITY RECD PER PART / DASH NO.							ITEM	QTY	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES
06	05	04	03	02	01								
1	1	1	1	0	0	38	B	252122-01	RCA JACK, WHITE	CN3			
1	1	1	1	0	0	39	B	252122-02	RCA JACK, RED	CN4			
1	1	1	1	0	0	40	B	252122-03	RCA JACK, YELLOW	CN10			
5	5	5	5	5	5	41	A	390248-01	RCA JACK, METAL	CN3, CN4, JN10		MAY SUBSTITUTE FOR ITEMS 39 34 & 40	
1	1	1	1	1	1	42	A	325516-04	HEADER 4 PIN, POLARIZED SIL	CN12			
						43							
1	1	1	1	1	1	44	A	903326-08	HEADER, 9 PIN, SIL	CN13			
1	1	1	1	1	1	45	A	903345-17	HEADER, 34 PIN, DIL	CN11			
1	1	1	1	1	1	46	A	390224-01	HEADER, DUAL, RA, LONG, 56 POS. MALE	CNX			
						47							
1	1	-	-	-	-	48	A	902410-15	RESISTOR NETWORK, 10K X9, 10 PIN	RP501			
1	1	1	1	1	1	49	A	340227-03	RESISTOR NETWORK, 22 OHM X 5, 10 PIN	RP103			
2	2	2	2	2	2	50	A	902422-05	RESISTOR NETWORK, 47 OHM X 4, 8 PIN	RP402, 403			
2	2	2	2	2	2	51	A	902422-06	RESISTOR NETWORK, 68 OHM X 4, 8 PIN	RP201, 202			
1	1	1	1	1	1	52	A	340227-05	RESISTOR NETWORK, 68 OHM X 5, 10 PIN	RP203			
1	1	1	1	0	0	53	A	902441-10	RESISTOR NETWORK, 120 OHM X 5, 6 PIN	RP405			
1	1	1	1	1	1	54	A	902442-17	RESISTOR NETWORK, 470 OHM X 7, 9 PIN	RP104			
3	3	4	4	4	4	55	A	902410-08	RESISTOR NETWORK, 4.7K X9, 10 PIN	RP101, 102, 401, 501		RP501 IS FOR -01, -02, -03 -04 ONLY	
1	1	1	1	0	0	56	A	902422-06	RESISTOR NETWORK, 68 OHM X 4, 8 PIN	RP404			
2	2	2	2	0	0	57	A	390126-01	ZERO OHM RESISTOR	W1, W2			
1	1	2	2	1	1	58	A	901550-118	RESISTOR, 1 OHM, 5%, 1/4W	EMI301, 406		EMI406 IS FOR -03 AND -04 ONLY (SEE ITEM 22)	
3	3	1	1	0	0	59	A	901550-129	RESISTOR, 5.1 OHM, 5%, 1/4W	EMI401, R405, R406			
2	2	2	2	2	2	60	A	901550-64	RESISTOR, 10 OHM, 5%, 1/4W	R301, R302			
2	2	2	2	2	2	61	A	901550-90	RESISTOR, 27 OHM, 5%, 1/4W	R101, R102			
3	3	3	3	3	3	62	A	901600-15	RESISTOR, 47 OHM, 5%, 1/2W	EMI501-503			
2	2	2	2	2	2	63	A	901550-108	RESISTOR, 300 OHM, 5%, 1/4W	R321, R321			
2	2	2	2	2	2	64	A	901550-57	RESISTOR, 390 OHM, 5%, 1/4W	R325, R325			
0	0	1	1	1	1	65	A	901550-58	RESISTOR, 470 OHM, 5%, 1/4W	R305			
7	7	5	5	5	5	66	A	901550-01	RESISTOR, 1K OHM, 5%, 1/4W	R203, R204, R224, R234, R713, R305 (-05 & -06 ONLY) R404			
0	0	0	0	1	1	67	A	901550-17	RESISTOR, 1.2K OHM, 5%, 1/4W	R704			
0	0	0	0	1	1	68	A	901550-23	RESISTOR, 2.7K OHM, 5%, 1/4W	R701			
0	0	0	0	1	1	69	A	901550-39	RESISTOR, 3.9K OHM, 5%, 1/4W	R702			
5	5	5	5	5	5	70	A	901550-19	RESISTOR, 4.7K OHM, 5%, 1/4W	R402, R403, R503, R504, R502			
8	8	8	8	8	8	71	A	901550-20	RESISTOR, 10K OHM, 5%, 1/4W	R322, R323, R332, R333, R339, R501, R505,			
0	0	0	0	1	1	72	A	901550-15	RESISTOR, 27K OHM, 5%, 1/4W	R703			
1	1	1	1	1	1	73	A	901550-22	RESISTOR, 47K OHM, 5%, 1/4W	R712			
1	1	1	1	1	1	74	A	901550-84	RESISTOR, 1M OHM, 5%, 1/4W	R711			

Commodore

TITLE: A500 PCB ASSEMBLY

DRWN BY: J. PORTER
CHKD:

DATE: ENGR: [Signature]
APPR:

DATE: SIZE: B

312510

REV: C SHT: 6

QUANTITY REQD PER PART / DASH NO.

QUANTITY REQD PER PART / DASH NO.							ITEM	DS	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES
06	05	04	03	02	01								
0	0	0	0	0	0	75	A	901550-75	RESISTOR, 120 OHM, 5% 1/4W	R103-108			
						76							
2	2	2	2	0	0	77	A	901550-20	RESISTOR, 10K OHM, 5%, 1/4W	R306, R308			
1	1	1	1	0	0	78	A	901550-23	RESISTOR, 2.7K OHM, 5%, 1/4W	R307			
2	2	2	2	0	0	79	A	901550-82	RESISTOR, 470K OHM, 5% 1/4W	R326, R326			
1	1	0	0	0	0	80	A	901550-89	RESISTOR, 150 OHM, 5% 1/4W	R409			
						81							
-	-	-	-	2	2	82	B	252133-01	FERRITE BEAD	FB801, 802			
-	-	16	16	-	-	83	B	903025-01	FERRITE BEAD	FB802, FB101, EMI 411-417, EMI421-427			
22	22	-	-	-	-	84	B	903025-01	FERRITE BEAD	FB802, FB101, EMI 411-417, EMI421-427, EMI 402, EMI 431-435			
						85	I						
-	-	-	-	71	71	86	B	251842-02	EMI FILTER 100PF	EMI 301-303, 401-403, 411-413, 421-427, 431-433, 511-524, 531-533, 601, 602, 611-626, 701-704			
-	-	57	57	-	-	87	B	251842-02	EMI FILTER 100PF	EMI 101, 302, 303, 305, 306, 402-404, 407, 431-435, 511-524, 531-533, 601, 602, 611-626, 702-704			
53	53	-	-	-	-	88	B	251842-02	EMI FILTER 100 PF	EMI 302, 303, 305, 306, 403-407, 511-524, 531-533, 601, 602, 611-626, 702-704, 101			
						89							
0	0	0	0	1	1	90	A	900462-27	CAPACITOR, 39PF, MLC, AXIAL, NPO	C703			
0	0	0	0	1	1	91	A	900462-37	CAPACITOR, 10PF, MLC, AXIAL, NPO	C704			
0	0	0	0	1	1	92	A	900463-15	CAPACITOR, 1000PF MLC, AXIAL, X7R	C705			
6	6	6	6	0	0	93	A	900463-16	CAPACITOR, 1000PF MLC, AXIAL, X7R	C411-413, C421-423			
2	2	2	2	2	2	94	A	900463-23	CAPACITOR, 3900PF, MLC, AXIAL, X7R	C323, C333			
2	2	2	2	2	2	95	A	900463-26	CAPACITOR, 6800PF, MLC, AXIAL, X7R	C322, C332			
-	-	-	-	4	4	96	A	390082-02	CAPACITOR, .01UF, MLC, AXIAL, Z5U	CA10, CA12, C801, C713			
2	2	2	2	-	-	97	A	390082-02	CAPACITOR, .01UF, MLC, AXIAL, Z5U	C333, C713			
4	4	4	4	4	4	98	A	900463-38	CAPACITOR, .047UF MLC AXIAL X7R	C311-314			
16	16	16	16	17	17	99	A	390082-01	CAPACITOR, .1UF MLC, AXIAL, Z5U	C7, C8, C10, C11, C12, C15, C33-37, C39, C321, C331, C711, C701 (-01 & -02)			
32	32	32	32	32	32	100	A	390082-05	CAPACITOR, .22UF MLC, AXIAL, Z5U	C1-06, C16-C32, C14, C40-42, C301, C302, C305, C501, C502			
2	2	2	2	0	0	101	A	390082-05	CAPACITOR, .22UF, MLC, AXIAL, Z5U	C325, C335			
						102							
						103							
2	2	2	2	2	2	104	A	390101-06	CAPACITOR, 10UF, ELECT. RADIAL	C306, C712			
4	4	4	4	4	4	105	A	390101-04	CAPACITOR, 22UF, ELECT, RADIAL	C303, C304, C307, C334			C307 IS FOR -01 & -02, -05, -06
6	6	6	6	6	6	106	A	390101-01	CAPACITOR, 47UF, ELECT, RADIAL	C812-815, C821, C822			
2	2	2	2	1	1	107	A	390101-02	CAPACITOR, 100UF, ELECT, RADIAL	C307, C811			C307 IS FOR -03 & -04 ONLY
2	2	2	2	2	2	108	A	900100-56	CAPACITOR, 3300UF, 10V, ELET. RADIAL	C401, C402			
						109							
0	0	0	0	1	1	110	A	251029-06	VARIABLE CAPACITOR 4.5-45PF	C702			YELLOW
						111							

Commodore

TITLE: A500 PCB ASSEMBLY

DRWN BY: J. PORTER	DATE	ENGR: J. Porter	DATE	SIZE B	REV C	SHT 4/6
CHKD:		APPR:			312510	

QUANTITY REQD PER PART / DASH NO.							ITEM	DS	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES
06	05	04	03	02	01								
	0	0	0	0	1	1	112	A	390234-01	TRANSISTOR, 2N5770, NPN OSC.	Q701		
	2	2	2	2	2	2	113	E	902658-01	TRANSISTOR, 2N3404, NPN GP	Q501, Q711		
	3	3	3	3	2	2	114	A	902707-01	TRANSISTOR, 2N3906, NPN GP	Q502, Q503, Q301		(Q301) for -03E -04 AND -05 E -06
							115						
	1	1	1	1	1	1	116	B	900850-01	DIODE, 1N4148	D501		
	2	2	2	2	0	0	117	A	390254-01	TRANSISTOR, JFET, 1N4302 MPF-102	Q321, Q331		
							118						
	1	1	1	1	1	1	119	A	390229-01	VIDEO HYBRID	HY1		
	1	1	1	1	1	1	120	E	251878-02	LINE FILTER, 5 PIN	LF1		
	0	0	0	0	1	1	121	A	901151-14	CHOKE 3.3uH	L701		
	0	0	0	0	0	1	122	A	900556-11	CRYSTAL 28.63636 MHz	Y1		NTSC REV3
	0	0	0	0	1	0	123	A	900556-12	CRYSTAL 28.37516 MHz	Y1		PAL REV3
	0	1	0	1	0	0	124	B	325566-14	OSCILLATOR 28.63636 MHz	X1		NTSC REV4+REV5
	1	0	1	0	0	0	125	B	252344-01	OSCILLATOR 28.37516 MHz	X1		PAL REV4+REV5
							126						
							127						
	3	3	3	3	3	3	128	A	904150-06	SOCKET 40 PIN DIP	U6, U7, U8		
	3	3	3	3	3	3	129	E	251313-01	SOCKET 48 PIN DIP	U3, U4, U5		
	3	3	3	3	3	3	130	B	251313-02	SOCKET 48 PIN DIP	U3, U4, U5		SUBSTITUTE FOR ITEM 129
	1	1	1	1	1	1	131	A	390195-01	SOCKET 6A PIN PLOC	U2		
	1	1	1	1	1	1	132	A	904150-10	SOCKET 6A PIN DIP	U1		
							133						
	0	0	1	1	1	1	134	B	312519-01	WIRE ASSY JUMPER			
							135						
	0	6	0	6	0	0	136	A	900462-37	CAPACITOR, 100 pF, MLC, AXIAL, NPO	C101		R106, R107, R108, R103, EMI 402
	0	3	0	3	0	0	137	A	390082-02	CAPACITOR, 0.01 uF, MLC, AXIAL, 25V	C801		C802, C803
	5	5	5	5	5	5	138	A	380223-03	IC, 256K X 1BIT DYNAMIC RAM	U16-31		SUBSTITUTE FOR ITEM 15
	5	5	5	5	5	5	139	A	390226-03	IC, 256K X 1BIT DYNAMIC RAM	U11-31		SUBSTITUTE FOR ITEM 15
	5	5	5	5	5	5	140	A	390226-05	IC, 256K X 1BIT DYNAMIC RAM	U13-31		SUBSTITUTE FOR ITEM 15

COMMODORE
ADVANCED REPRO

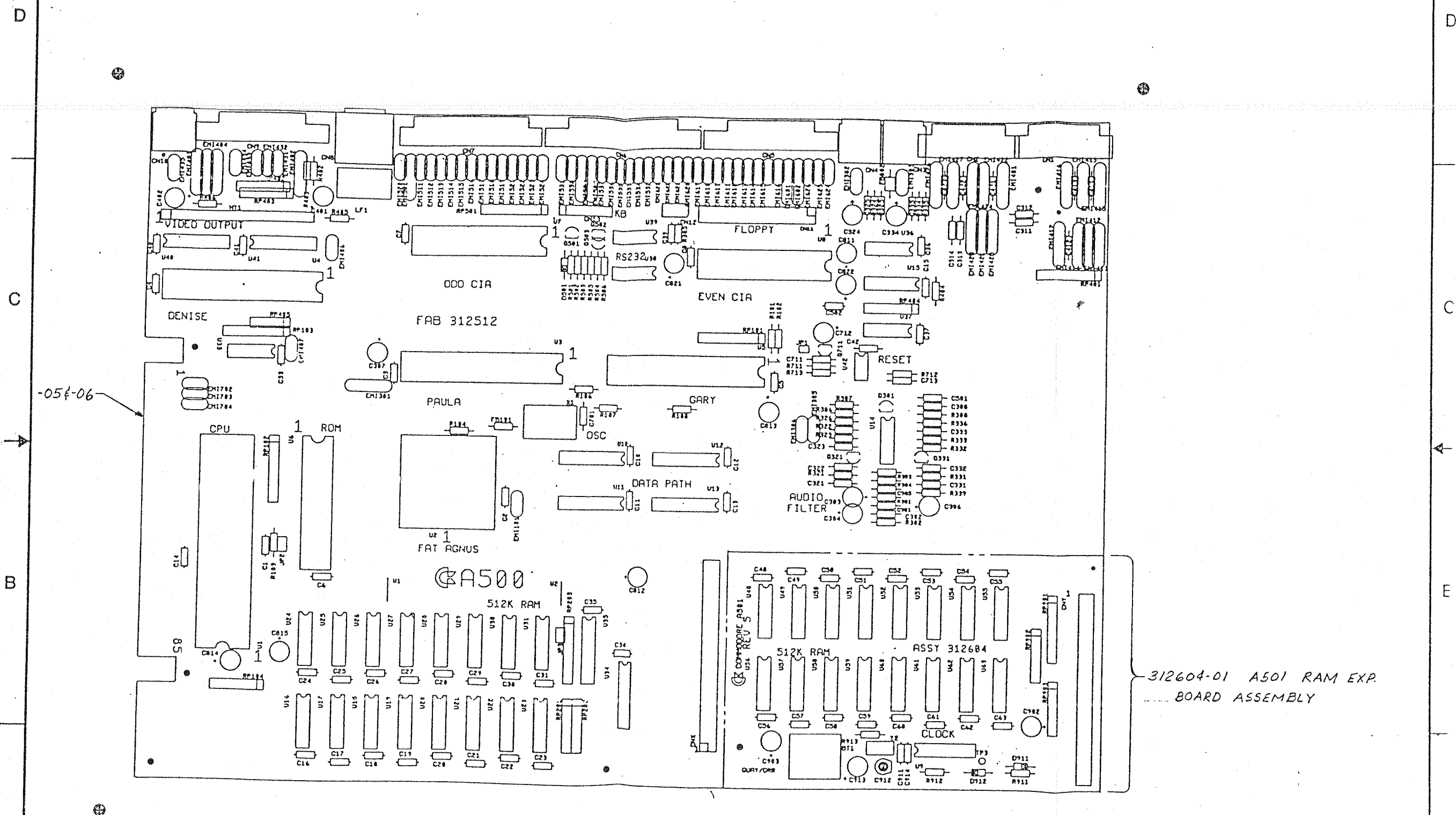
TITLE: A500 PCB ASSEMBLY

DRWN BY: J. PORTER	DATE	ENGR: J. PORTER	DATE	SIZE E	312510	REV G	SHT 5/6
CHKD:		APPR:					

PART NO.	DESCRIPTION
312510-05	A500, PCB ASSEMBLY - NTSC
312510-06	A500, PCB ASSEMBLY - PAL

SHARP GRAPHICS, INC.
REV. 01/87

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
		SEE SHEET 1		



-05f-06

312604-01 A501 RAM EXP.
BOARD ASSEMBLY

COMMODORE 4/86/87
C/A 588

UNLESS OTHERWISE SPECIFIED TOLERANCES ON DECIMALS X XX XXX L3 * 2 * FINISH:	DRAWN BY: T. COLEY	DATE: 1-19-87	commodore	
	CHKD: ENGR: G. ROBBINS	1-15-87	PCB ASSEMBLY A500	
MATERIAL:	USED ON: AMUGA A500	NEXT ASSY:	SIZE: C	REV: C
			312510	SHEET 6 OF 6

REV	DESCRIPTION	DATE	APVLR	MANAGER
1	Engineering Prototype	07/13/86	GAA	
2	Advanced Engineering Release	11/23/86	GAA	
3	Pilot Production Release (FTZ)	02/04/87	GAA	
4	Pilot Production Release (FCC)	VOID	GAA	
5	Pilot Production Release	05/04/87	GAA	<i>S. Patton</i>
6	REVISED PER ECO 870257	9/14/87		<i>W. Bucher</i>

Jumpers and Test Points

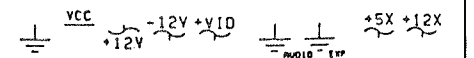
- JP1 - System Reset vs. Keyboard Reset
- JP2 - Memory Expansion Address Select
- JP3 - Internal Memory Address Select

TP1 - 64 Hz Real-Time Clock Test Point

SIGNAL	DESCRIPTION
28MHZ	28.63636 MHz Master Clock
7MHZ	7 MHz Processor Clock
A[23:1]	Processor Address (68000)
ACK	Data Acknowledge (Parallel)
AS	Address Strobe (68000)
AUDIN	Audio Input (RS232 jack)
AUDOUT	Audio Output (RS232 jack)
BEER	Bus Error (68000)
BG	Bus Grant (68000)
BGACK	Bus Grant Acknowledge (68000)
BLISS	Blitter Slowdown (chips)
BLIT	Chip Memory Access (chips)
BR	Bus Request (68000)
BUSY	Device Busy (parallel)
CASL/CASU	CAS lower/upper byte (DRAM)
CCK	Color Clock aka C1 (chips)
CCKQ	Color Clock Quadrature aka C3 (chips)
CDAC	7 MHz Quadrature Clock
CHNG	Media Change (floppy)
CLKRD/CLKWR	Real-time Clock Read/Write
COMP	Composite Monochrome Video (video)
CSYNC	Composite Sync (video)
CTS	Clear to Send (rs232)
D[15:0]	Processor Data (68000)
DIR	Direction (floppy)
DKRD	Diskette Read Data (floppy)
DKWDB	Diskette Write Data (floppy)
DKWEB	Diskette Write Enable (floppy)
DMAL	Chip DMA Request (chips)
DRA[8:0]	DRAM Address (DRAM, chips)
DRD[15:0]	DRAM Data (DRAM, chips)
DSR	Data Set Ready (rs232)
DTACK	Data Transfer Acknowledge (68000)
DTR	Data Terminal Ready (rs232)
E	Peripheral E Clock (68000)
EXRAM	Expansion Memory Present
FC[0:0]	Function Control (68000)
FIRE0/FIRE1	Fire Button (joysticks)
HLT	Processor Halt (68000)
HSYNC	Horizontal Sync (video)
INDEX	Diskette Index Hole (floppy)
INT[2,3,6]	Interrupt Requests (chips)
IORESET	I/O Reset
IPL[2:0]	Processor Interrupt Requests (68000)
KBCLOCK	Keyboard Clock (keyboard)
KBDATA	Keyboard Data (keyboard)
KBRESET	Keyboard Reset (keyboard)
LDS/UDS	Upper/Lower Data Strobe (68000)
LED	Power On LED

SIGNAL	DESCRIPTION
LEFT/RIGHT	Audio Channels
MTR	Motor On (floppy)
MTR0	Motor On Drive 0 (floppy)
MOV/MOH	Mouse Quadrature Signals (joysticks)
MLV/MLH	Mouse Quadrature Signals (joysticks)
OVL	Overlay ROM over RAM
OVR	Override System Decoding
PIXELSW	Pixel Switch (video)
POT0X/POT0Y	Pot Lines (joysticks)
POT1X/POT1Y	Pot Lines (joysticks)
POUT	Paper Out (parallel)
PPD[7:0]	Parallel Port Data (parallel)
RAMEN	RAM Enable (chips)
REGEN	Chip Register Enable (chips)
RAS0/RAS1	RAS Internal/Expansion Lines (DRAM)
RDY	Drive Ready (floppy)
RESET	General Reset
RG[8:1]	Register Address Bus (chips)
RI	Ring Indicate (rs232)
ROMEN	ROM Enable
RTS	Request to Send (rs232)
RST	Processor Reset (68000)
RXD	Receive Data (RS232)
RW	Processor Read/Write (68000)
SEL	Select (parallel)
SEL[3:0]	Drive Select (floppy)
SIDE	Side Select (floppy)
STEP	Head Step Command (floppy)
TRK0	Track 0 Sense (floppy)
TXD	Transmit Data (RS232)
VMA	Valid Memory Address (68000)
VPA	Valid Peripheral Address (68000)
VSYNC	Vertical Sync (video)
WE	Write Enable (DRAM)
WPROT	Write Protect Sense (floppy)
XCLK	External 28 MHz Clock (genlock)
XCLKEN	External Clock Enable (genlock)
XRDY	External Data Ready

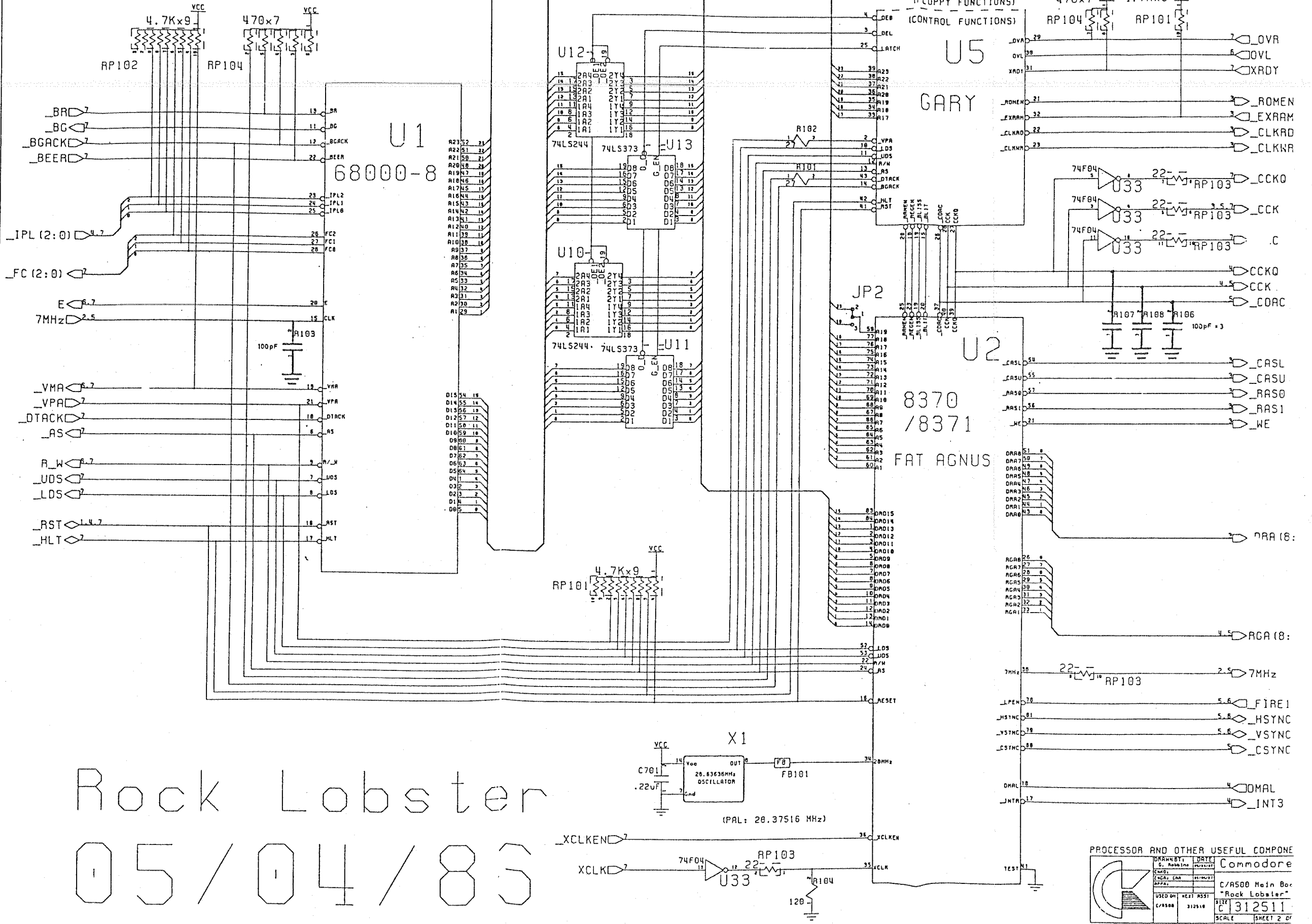
ATTEMPT TO FORCE NODE NUMBERS VIA SEQUENCE



A PAGE FOR SHARON AND VONNIE TO USE

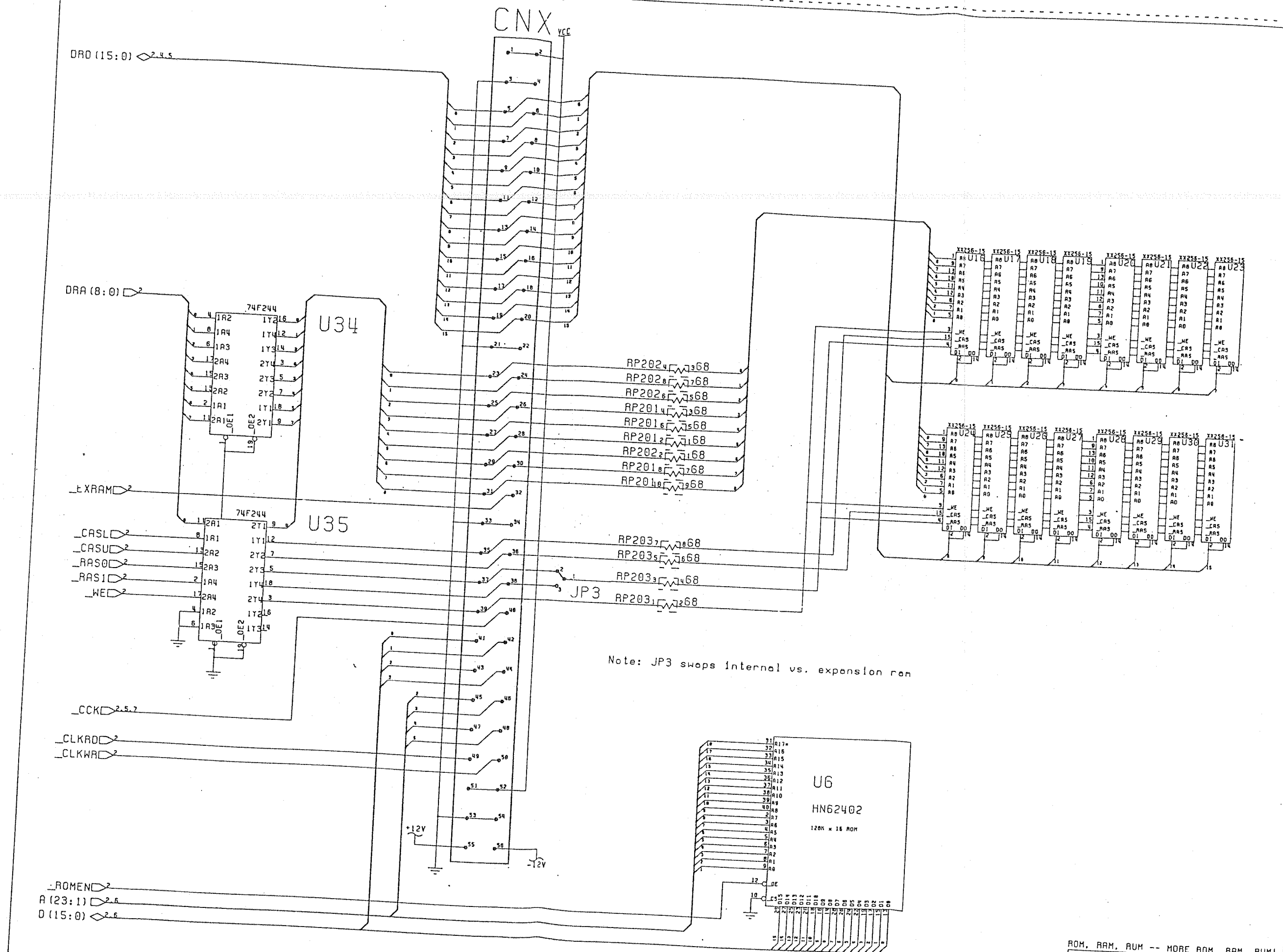
	DRAWN BY: G. Runkline CHECKED: GAA APPROVED: GAA	DATE: 9/14/87 SHEET: 1 OF 9
	C/AS00 Main Board "Rock Labeler" C/AS00 912510 SCALE: SHEET 1 OF 9	

Note: R103-104, 106-108 are from EMI control and may not be loaded in all cases
 JP2 controls where expansion ram maps to:
 A23 -> C00000 (default), A19 -> 0B0000



Rock Lobster
 05/04/83

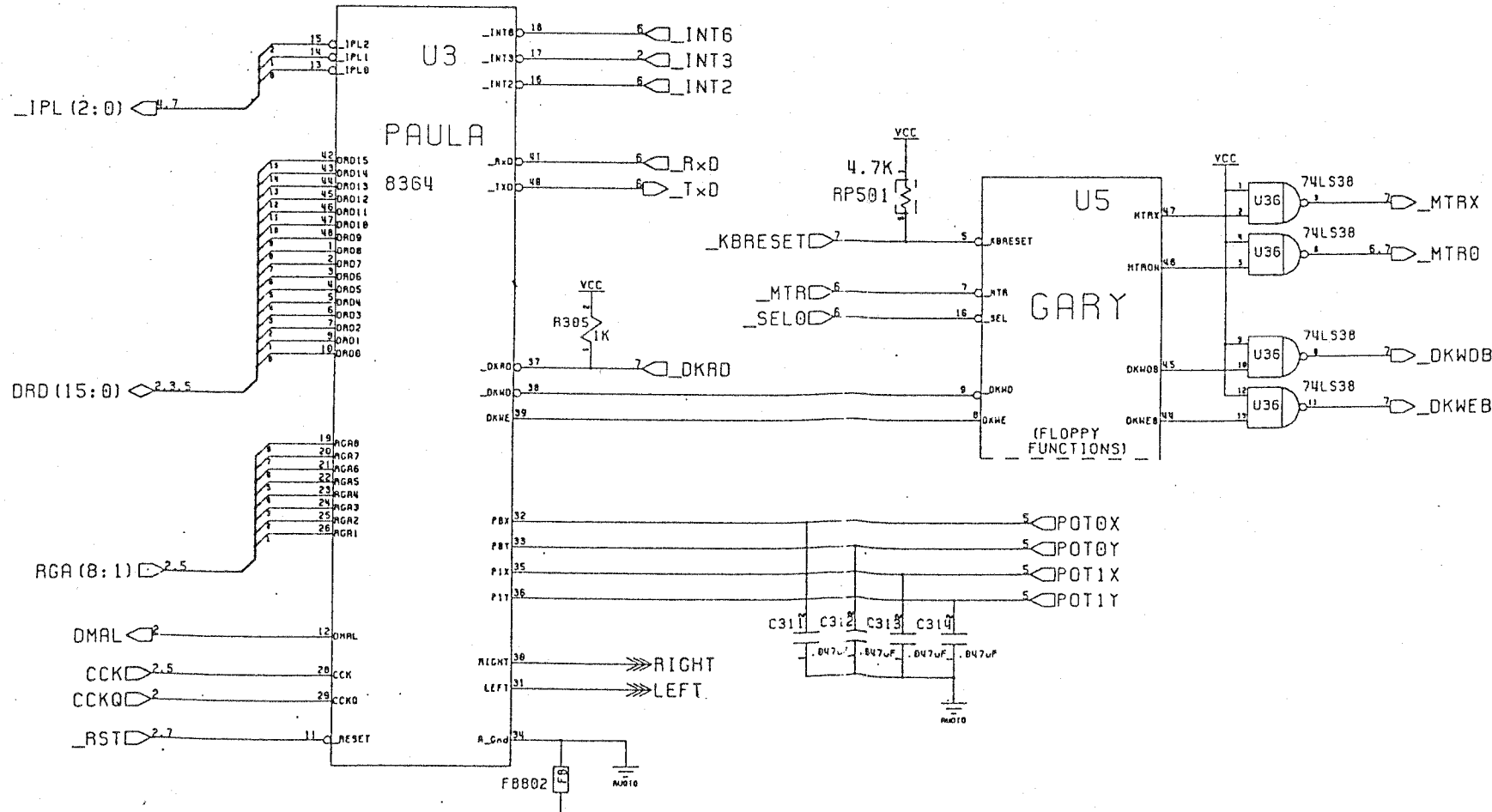
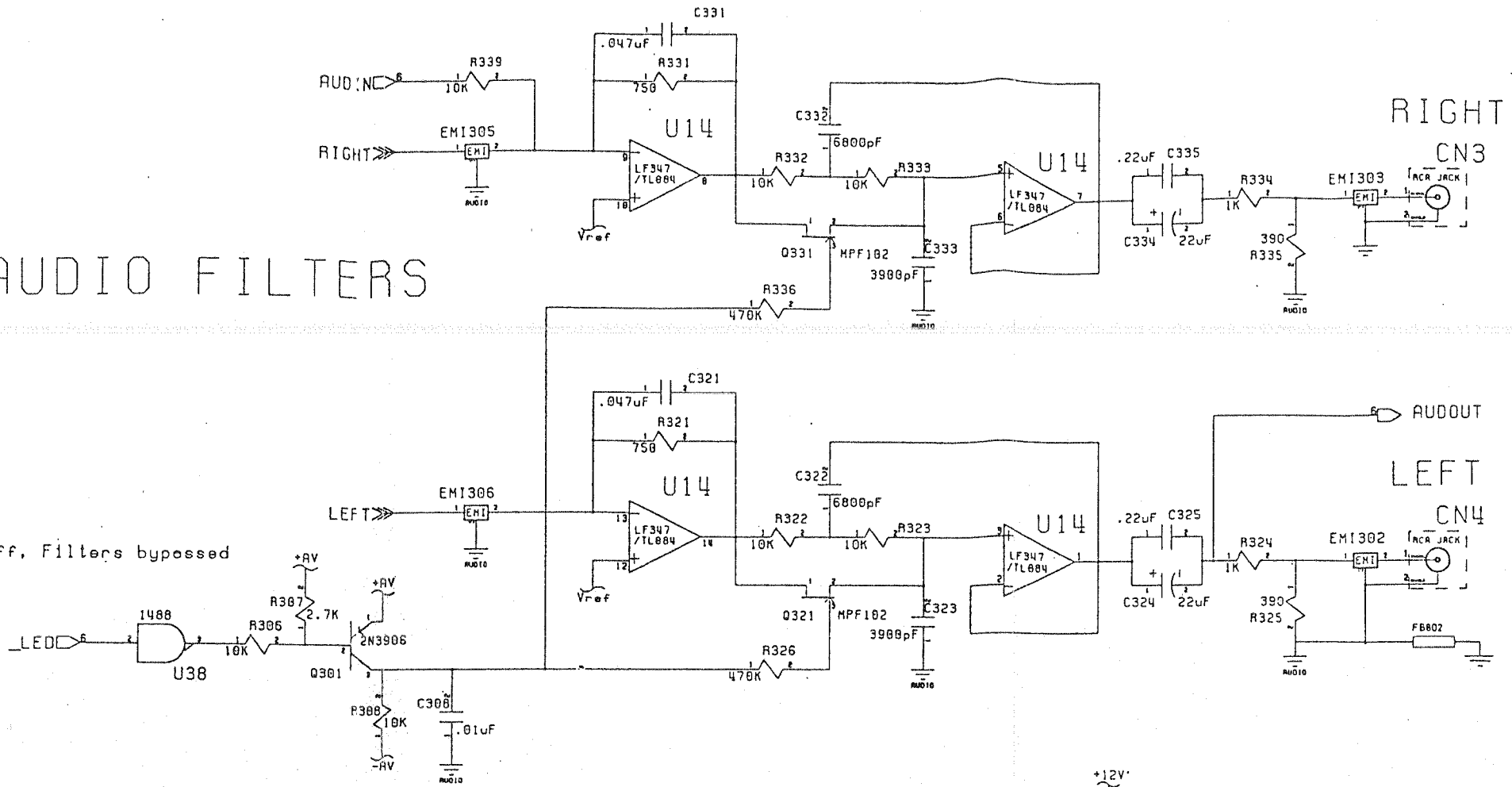
PROCESSOR AND OTHER USEFUL COMPONENTS	
Commodore	DATE
DATE	DATE
DESIGNED BY	DATE
Checked	DATE
Checked	DATE
Checked	DATE
USED ON	WEST ASST
C/A500	312510
SCALE	SHEET 2 OF



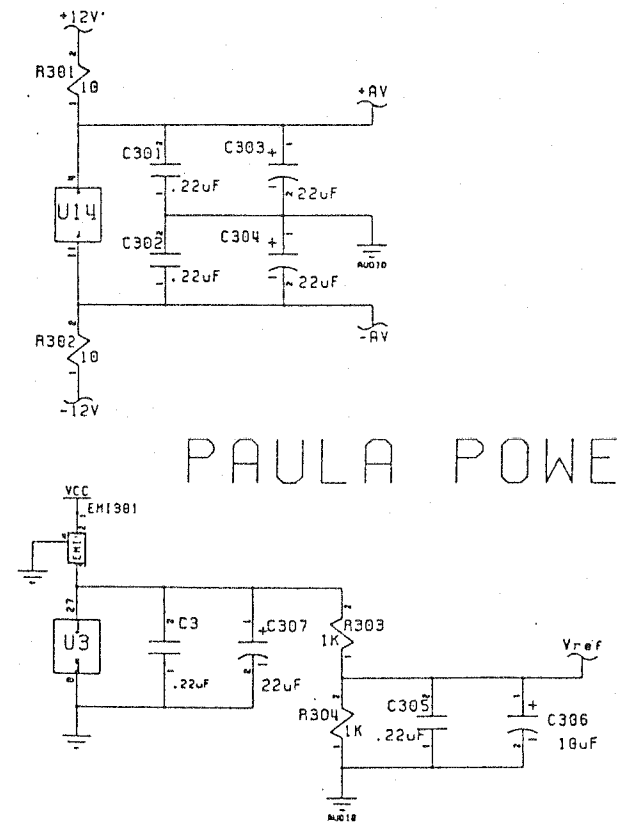
Note: JP3 swaps internal vs. expansion ram

AUDIO FILTERS

Note: LED off, Filters bypassed



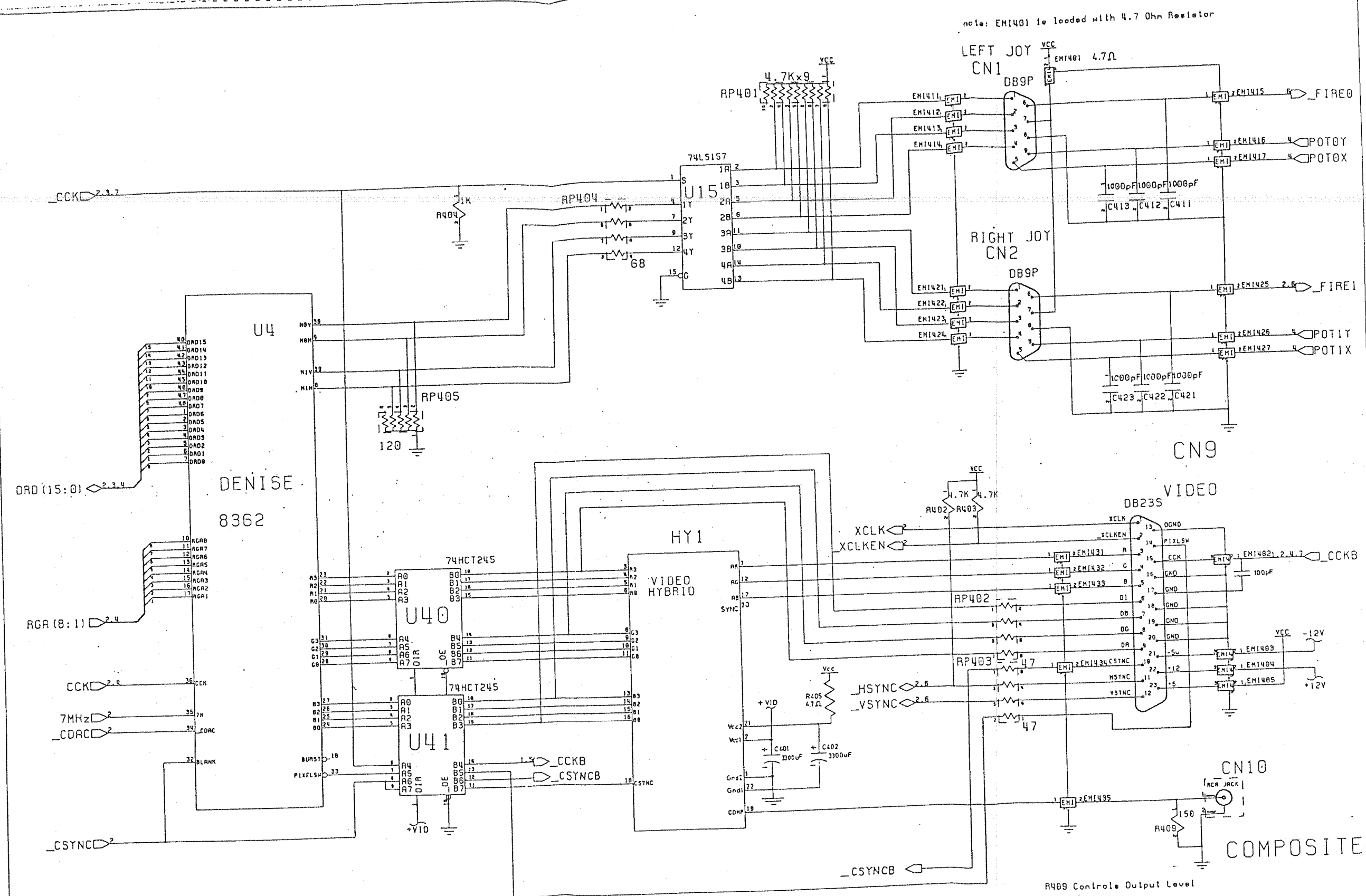
Note: Ground connection at Audio jacks



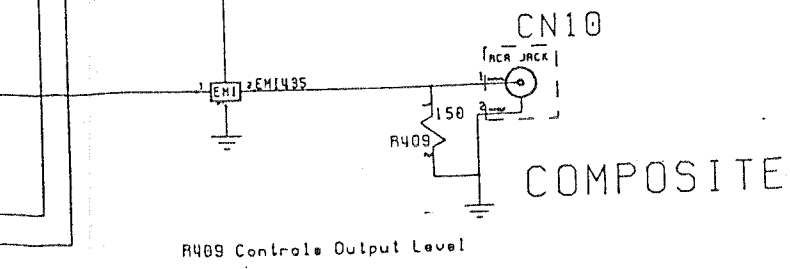
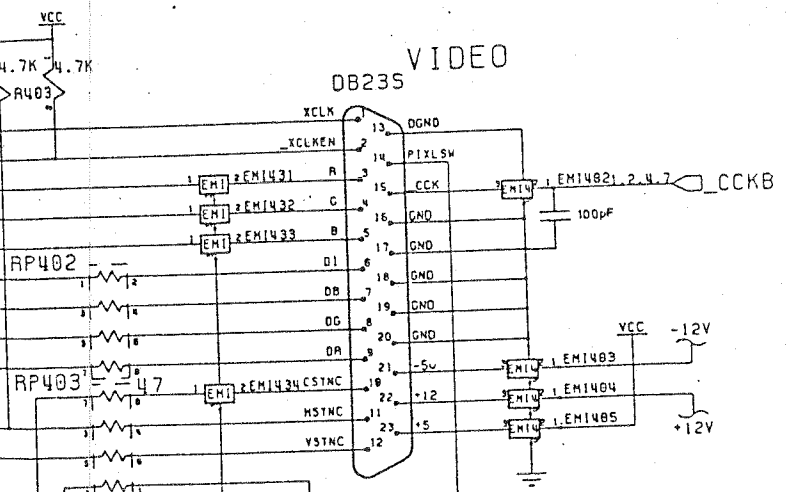
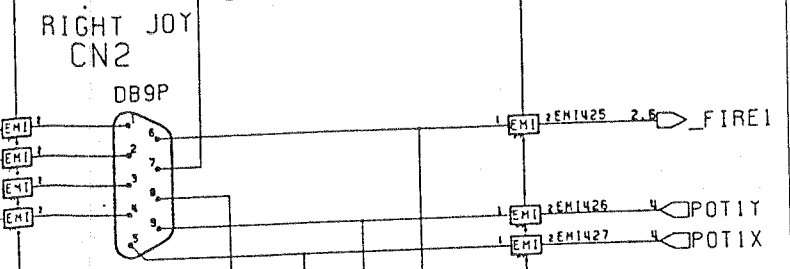
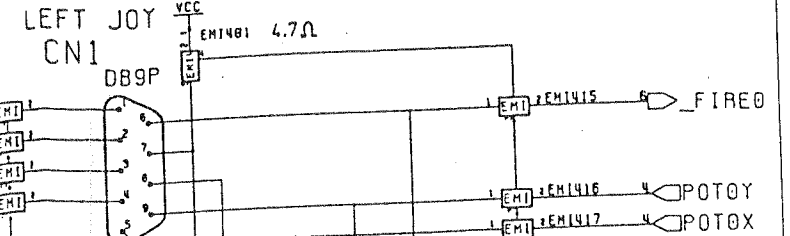
PAULA POWER!

PAULA DOES THINGS THAT DENISE DOESN'

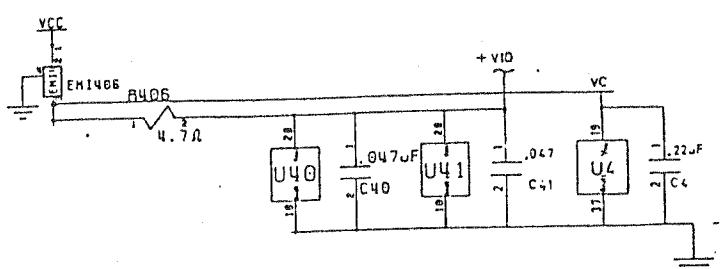
DESIGNED BY	DATE	Commodore
ENGR. LAR	REVISED	
APPA		
USED ON	WEST ASSY	C/R500 Main Board
L/AS00	312518	"Rock Lobster"
SCALE	312511	6
		SHEET 4 OF 9

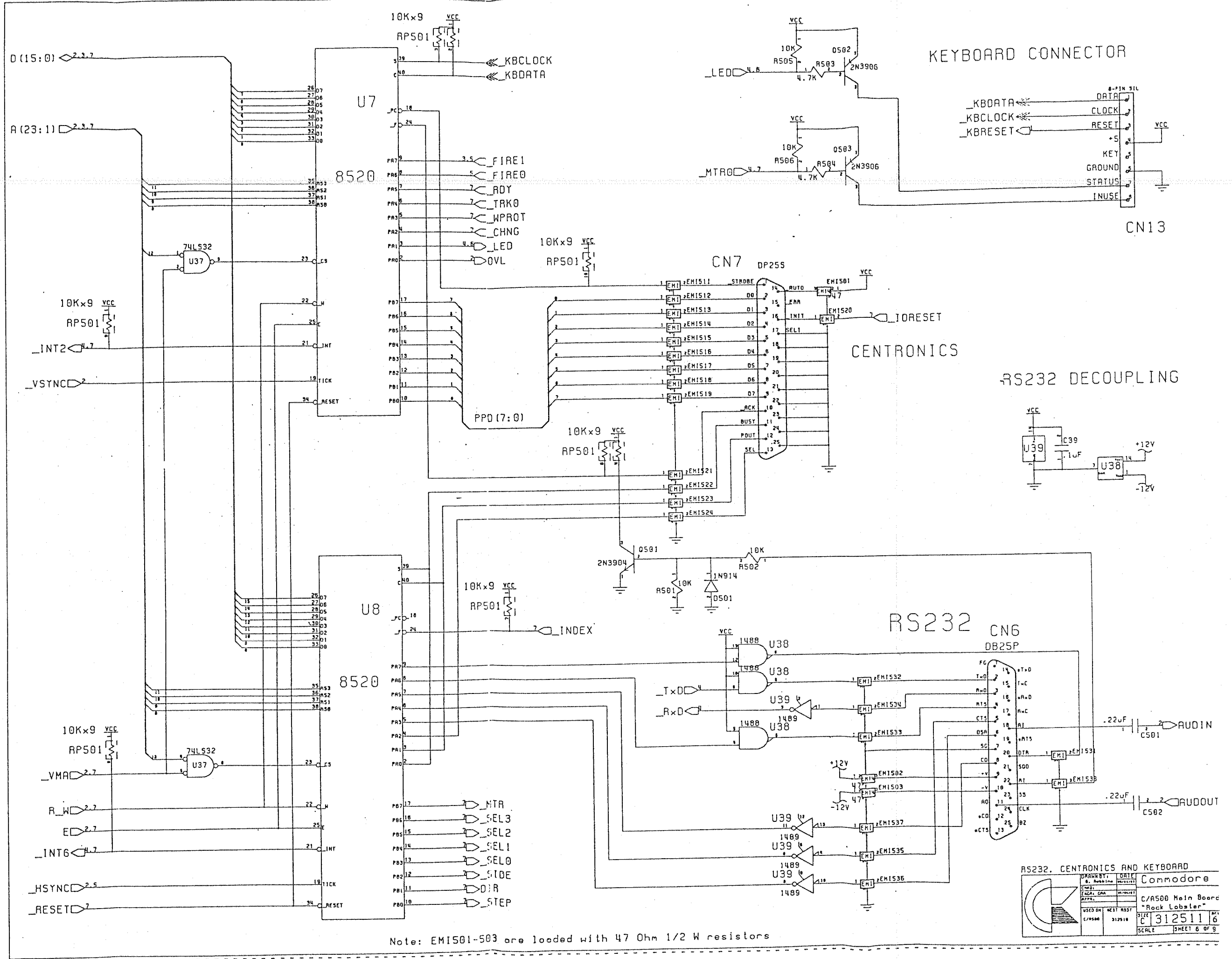


note: EMI401 is loaded with 4.7 Ohm Resistor



R409 Controls Output Level





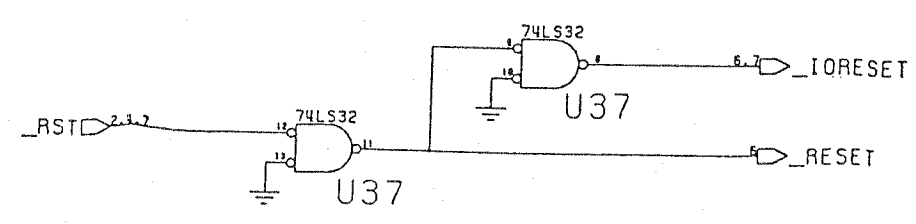
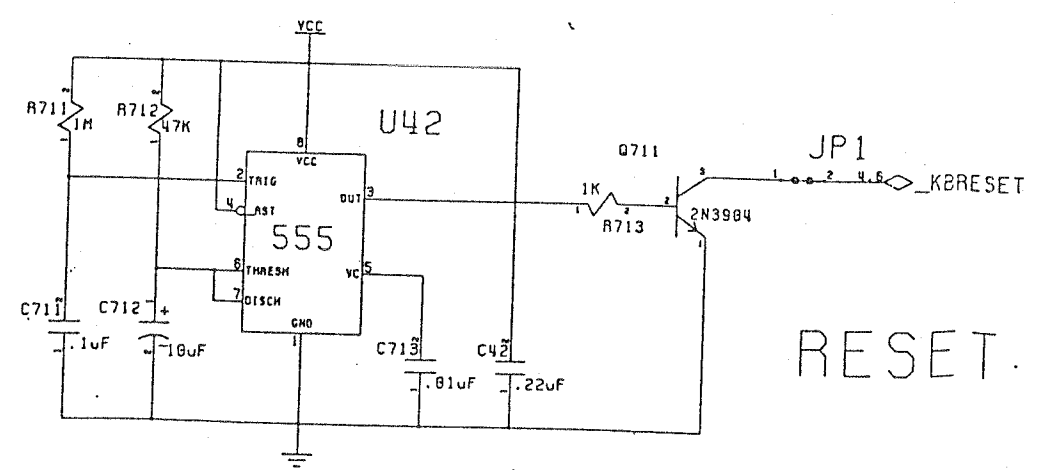
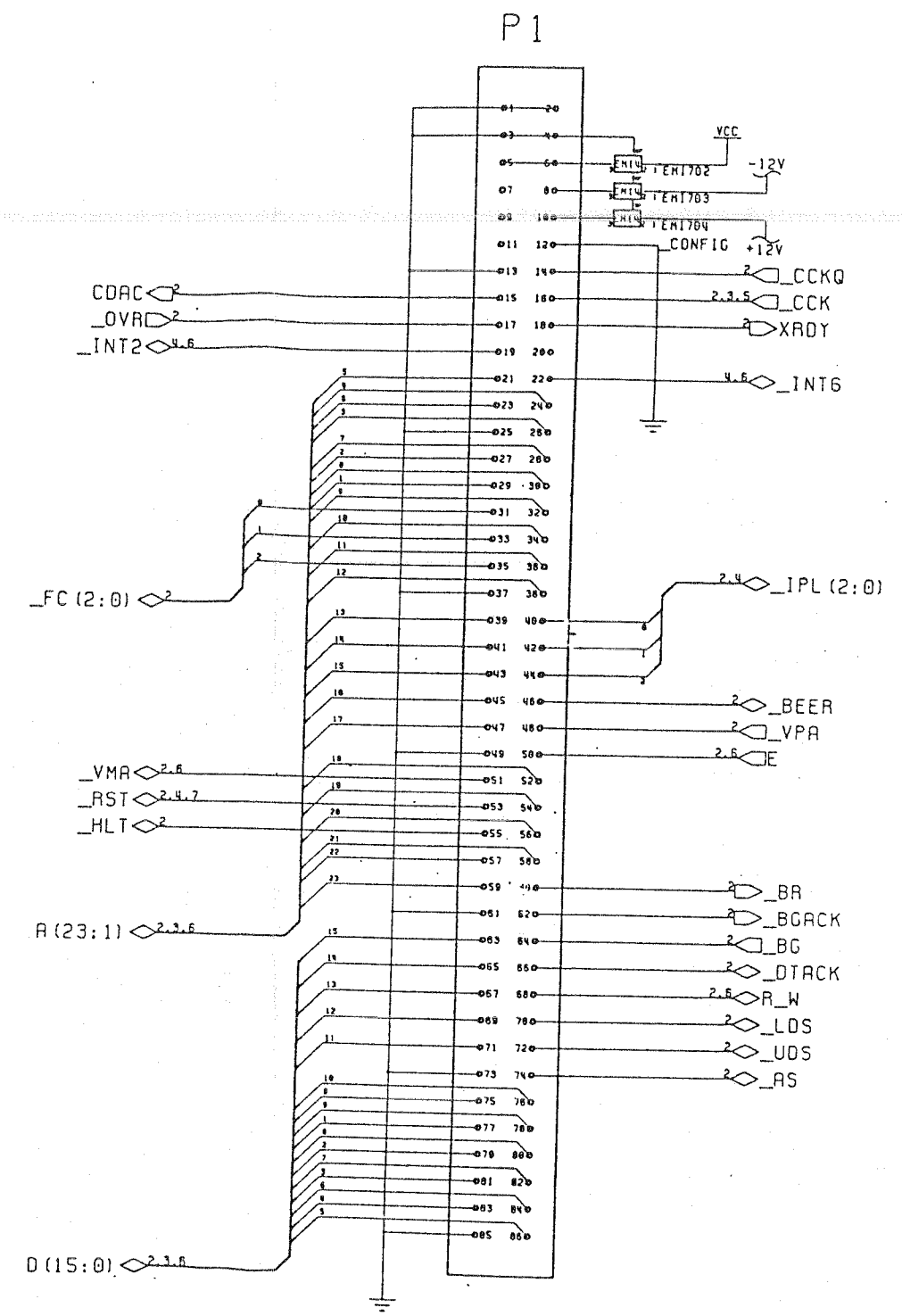
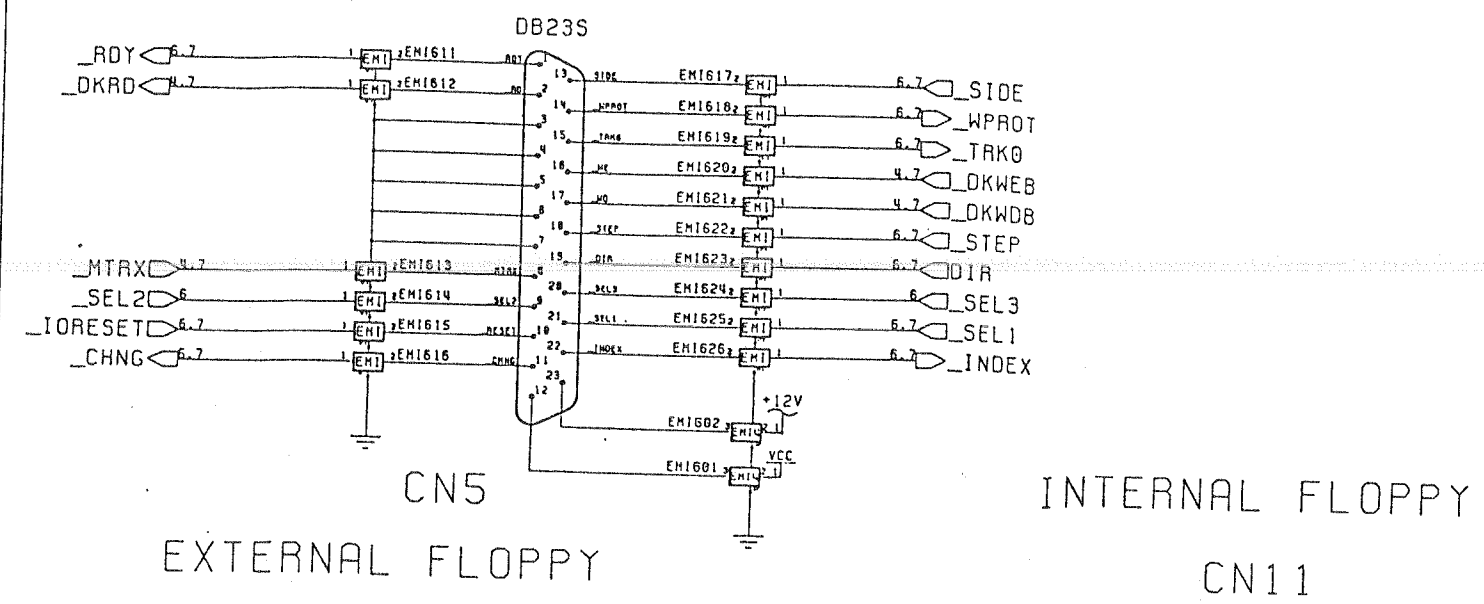
Note: EMIS01-503 are loaded with 47 Ohm 1/2 W resistors

RS232, CENTRONICS AND KEYBOARD

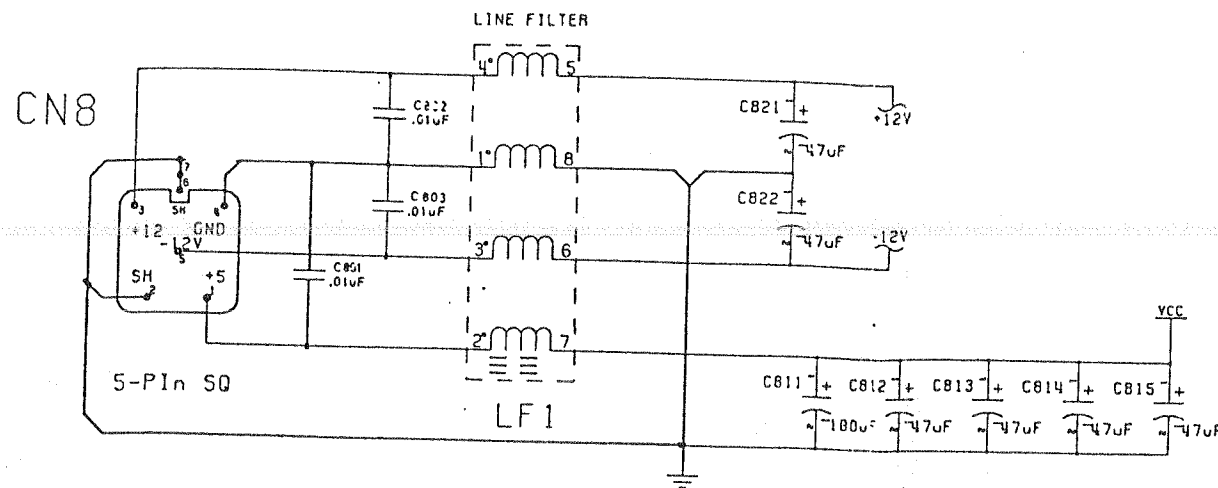
DRAWN BY:	DATE:
CHKD:	REVISED:
ENGR. CNA	APPV:
USED ON:	REV:
C/5000	312510

Rock Lobster
C/A500 Main Board
"Rock Lobster"
312511
SCALE: SHEET 6 OF 9

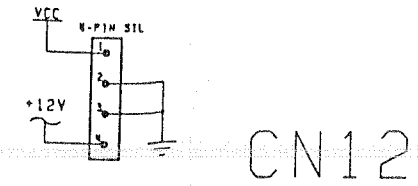
EXPANSION



POWER INPUT

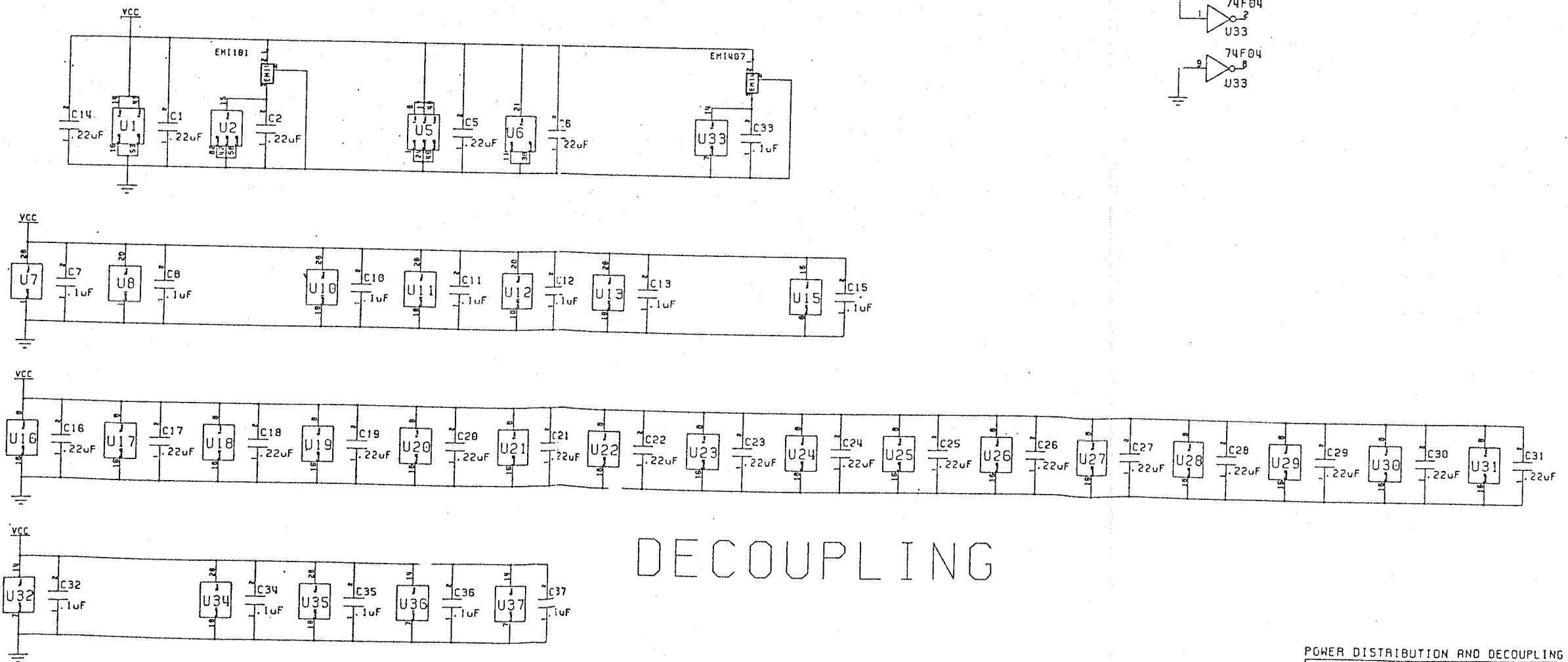
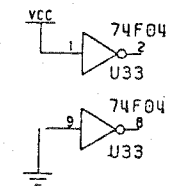


FLOPPY POWER

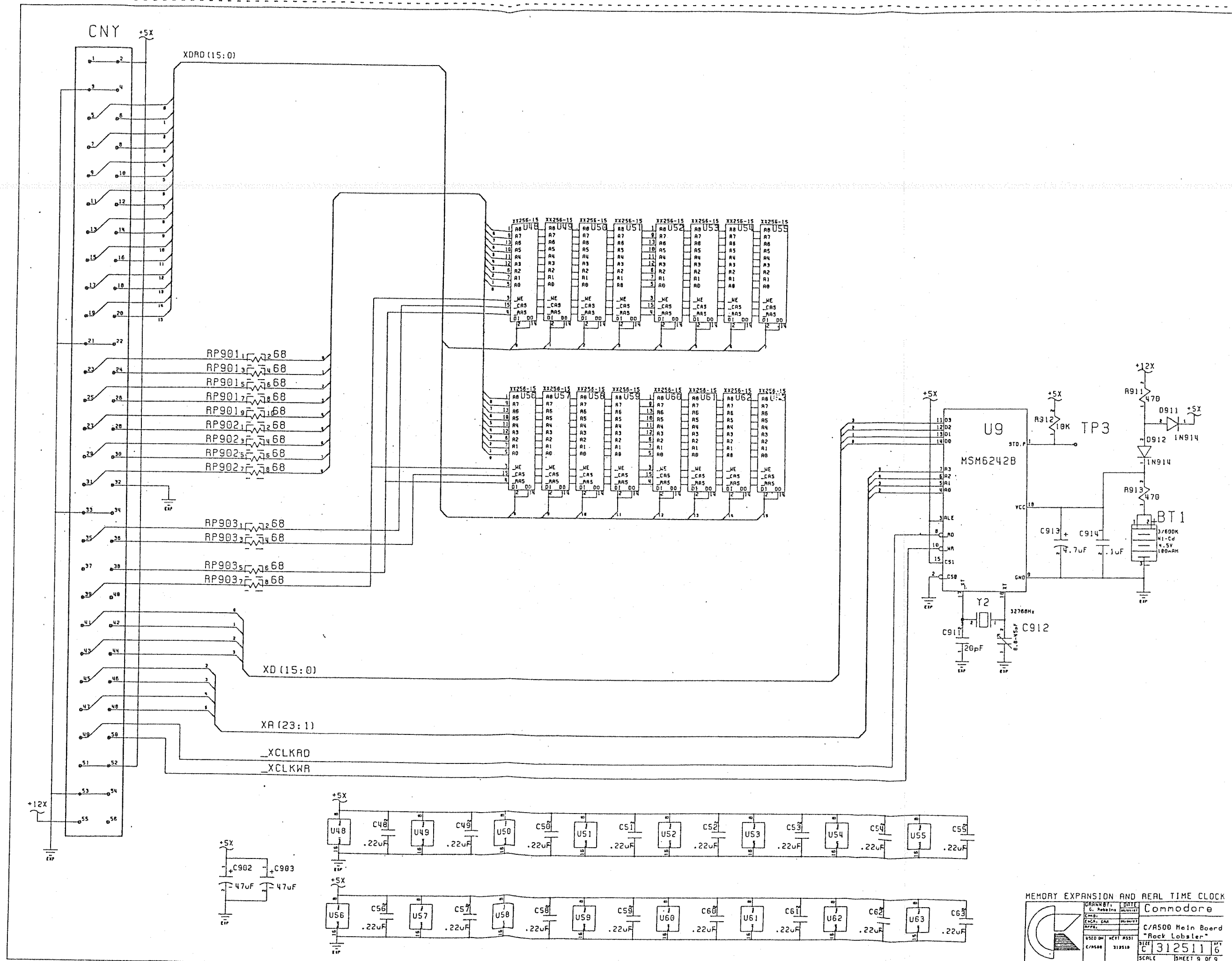


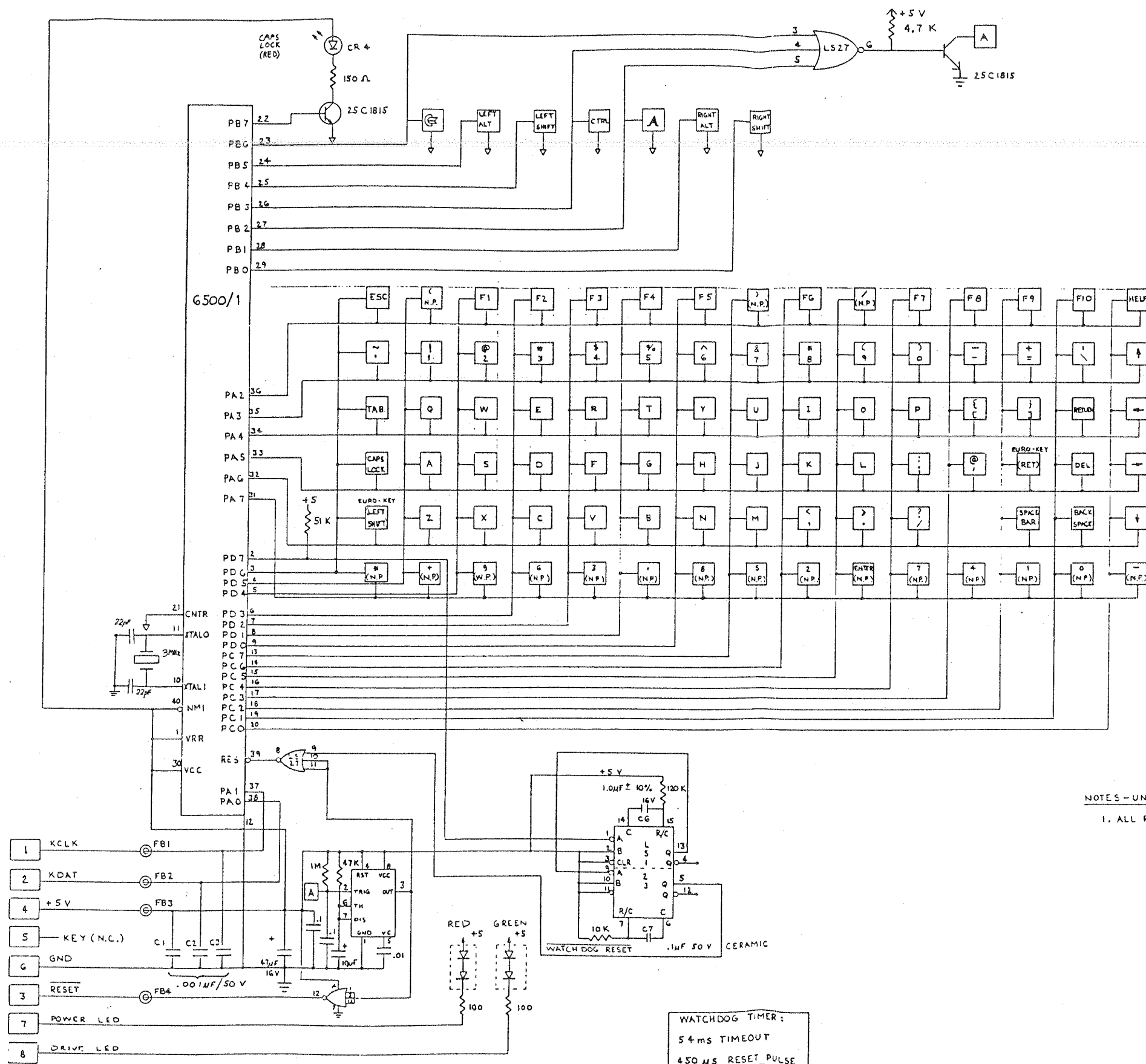
NOTE: HEAVY LINES INDICATE A SINGLE POINT CONNECTION.
W1 AND W2 ARE GROUND PLANE CONTINUITY JUMPERS

SPARES



DECOUPLING





NOTES - UNLESS OTHERWISE SPECIFIED:
 1. ALL RESISTORS ARE 1/4 W, 5% TOLERANCE.

WATCHDOG TIMER:
 54 ms TIMEOUT
 450 µs RESET PULSE

UNLESS OTHERWISE SPECIFIED:		DRAWN BY: C.J. WOOTERS		DATE: 9-10-86	
TOLERANCES ON DECIMALS:		CHKD: F.S. TEST		DATE: 11-7-86	
X		ENGR: M.A.P. F.H.		DATE: 7-11-86	
1		APPR:			
MATERIAL:		USED ON:		NEXT ASSY:	
FINISH:					
commodore					
KEYBOARD					
CONSUMER AMIGA					
SIZE: D		312502		REV: 2	
SCALE: ~ SHEET 3 OF 3					

ERSATZTEILE

PART NO.	DESCRIPTION	REVISIONS			
		LTR/ZONE	DESCRIPTION	DATE	APPROVED
312510-01	A500, PCB ASSEMBLY, NTSC	1	ADVANCED ENGINEERING RELEASE	11/7/82	<i>[Signature]</i>
312510-02	A500, PCB ASSEMBLY, PAL	2	PILOT PRODUCTION RELEASE & ADDED SHEET #6 of MODIFIED P.C.B. ENGINEER PRINT.		

I. SHEET 6 OF 6 SIZE C
ASSEMBLY DWG.

NOTES:

commodore	TITLE: A500, PCB ASSEMBLY	DRAWN BY: S.KOZACHYN	DATE 10/11/82	ENGR: S.H.B.	SIZE B	DRAWING NO. 312510
		CHKD:		APPR:	SHEET 1 OF 6	

ITEM	QUANTITY REQD PER PART/DASH NO.	SO	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES	DATE	SIZE	REV	SHT
								10/14/89	B	2	2
02 01											
R R	1		312511-01	PCB SCHEMATIC							
R R	2		312512-01	PCB FABRICATION DRAWING							
1 1	3		312513-01	PCB ARTWORK							
		4									
1 1	5		390084-03	IC, MC68000, 8MHZ	U1						
0 1	6		318070-01	IC, FAT AGNUS 8370 NTSC	U2						
1 0	7		318071-01	IC, FAT AGNUS 8371 PAL	U2						
1 1	8		252127-01	IC, PAULA, 8364	U3						
1 1	9		252126-01	IC, DENISE, 8362	U4						
1 1	10		318072-01	IC, GARY	U5						
2 2	11		318029-02	IC, 8520R4	U7,U8						
1 1	12		315093-01	ROM, KICKSTART V1.2	U6		TO BE PROGRAMMED ONTO 315094				
16 16	13		390026-01	IC, DRAM 256K X 1, 150 NS	U16-U31		MAY SUBSTITUTE 360223-01				
1 1	14		901882-01	IC, 1488	U38						
1 1	15		901883-01	IC, 1489	U39						
1 1	16		390086-01	IC, LF347/TL084	U14						
1 1	17		390110-01	IC, 74F04	U33						
1 1	18		901521-31	IC, 74LS32	U37						
1 1	19		901521-38	IC, 74LS38	U36						
1 1	20		390081-01	IC, 74F74	U32						
1 1	21		901521-11	IC, 74LS157	U15						
2 2	22		318050-01	IC, 74F244	U34,U35						
2 2	23		901521-13	IC, 74LS244	U10,U12						
2 2	24		310003-01	IC, 74HC245	U40,U41						
2 2	25		901521-29	IC, 74LS373	U11,U13						
1 1	26		901523-01	IC, NE555	U42						
1 1	27		252167-01	DN, 5 PIN, SQUARE	CN8		POWER				
2 2	28		327032-02	DB9P, D-SUB, 9 PIN, MALE	CN1,CN2		JOYSTICK				
S S	29		390242-02	DB9P, D-SUB, 9 PIN, MALE	CN1,CN2		SUBSTITUTE FOR ITEM 28				
1 1	30		327032-03	DB23P, D-SUB, 23 PIN, MALE	CN9		VIDEO				
S S	31		390242-03	DB23P, D-SUB, 23 PIN, MALE	CN9		SUBSTITUTE FOR ITEM 30				
1 1	32		327033-03	DB23S, D-SUB, 23 PIN, FEMALE	CN5		DISK DRIVE				
S S	33		390241-03	DB23S, D-SUB, 23 PIN, FEMALE	CN5		SUBSTITUTE FOR ITEM 32				
1 1	34		327032-05	DB25P, D-SUB, 25 PIN, MALE	CN6		RS232				
S S	35		390242-05	DB25P, D-SUB, 25 PIN, MALE	CN6		SUBSTITUTE FOR ITEM 34				
1 1	36		327033-05	DB25S, D-SUB, 25 PIN, FEMALE	CN7		CENTRONICS				
S S	37		390241-05	DB25S, D-SUB, 25 PIN, FEMALE	CN7		SUBSTITUTE FOR ITEM 36				

commodore

TITLE: A500, PCB ASSEMBLY

DRAWN BY: S.KOZACHYN
CHKD:

ENGR:
APPR:

DATE: 10/14/89
SIZE: B

REV: 2
SHT: 6

QUANTITY	REQD. PER PART/DASH. NO.	ITEM	OS	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES	REV	SHT	
											DATE
		0201									
1	1	38		252122-01	RCA JACK, WHITE	CN3		SEE ITEM 73	2	3	
1	1	39		252122-02	RCA JACK, RED	CN4					
1	1	40		252122-03	RCA JACK, YELLOW	CN10					
1	1	41		903326-04	HEADER, 4-PN SL	CN12					
1	1	42		903326-08	HEADER, 8-PN SIL	CN13					
1	1	43		903345-17	HEADER, 34 PIN DL	CN11					
1	1	44		390243-01	HEADER, DUAL, RA, LONG, 56 POS., MALE	CNX					
1	1	45		390227-05	RESISTOR NTWK. 68 OHM PARALLEL X 5, 10 PIN	RP203					
4	4	46		902410-08	RESISTOR NTWK. 4.7K PULLUP X 9, 10 PIN	RP101, RP102					
		47				RP401, RP501					
1	1	48		902442-17	RESISTOR NTWK, 470 PULLUP X 7, 8 PIN	RP104					
2	2	49		390227-03	RESISTOR NTWK, 22 OHM PARALLEL X 5, 10 PIN	RP103,					
2	2	50		902422-04	RESISTOR NTWK, 68 OHM PAR, x 4, 8 PIN	RP201, 202					
2	2	51		902422-05	RESISTOR NTWK, 47 PARALLEL X 4, S PIN	RP402, 403					
2	2	52		901550-64	10 OHM +/- 5% 1/4 WATT	R301, R302					
2	2	53		901550-90	27 OHM +/- 5% 1/4 WATT	R101, R102					
2	2	54		901550-57	390 OHM +/- 5% 1/4 WATT	R325, R335					
1	1	55		901550-58	470 OHM +/- 5% 1/4 WATT	R305					
2	2	56		901550-108	360 OHM +/- 5% 1/4 WATT	R331, R321					
5	5	57		901550-01	1K OHM +/- 5% 1/4 WATT	R303, R304					
		58				R324, R334					
1	1	59		901550-17	12K OHM +/- 5% 1/4 WATT	R704					
1	1	60		901550-23	2.7K OHM +/- 5% 1/4 WATT	R701					
1	1	61		901550-39	3.9K OHM +/- 5% 1/4 WATT	R702					
4	4	62		901550-19	4.7K OHM +/- 5% 1/4 WATT	R402, R403					
		63				R503, R504					
9	9	64		901550-20	10K OHM +/- 5% 1/4 WATT	R322, R323					
		65				R332, R333					
		66				R339, R501					
		67				R502, R506					
1	1	68		901550-15	27K OHM +/- 5% 1/4 WATT	R703					
1	1	69		901550-22	47K OHM +/- 5% 1/4 WATT	R712					
2	2	70		252133-01	FERRITE BEAD	FB801, 802					
1	1	71		901550-84	1M OHM +/- 5% 1/4 WATT	R711					
		72									
5	5	73		390248-01	RCA JACK	CN3, CN4, CN10		SUBSTITUTE FOR ITEMS 38, 39 & 40			
		74									

commodore

TITLE: A500, PCB ASSEMBLY

DRAWN BY: S.KOZACHYN
CHKD:

DATE: 10/15/86
ENGR:

DATE: _____
SIZE: B
APPR:

REV: 2
SHT: 3

312510

QUANTITY REQD PER PART/DASH NO.	K	OS	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES
	02	01					
	75		251842-02	EM FILTER 100PF	EMI301-303		
	72	72			EMI401-405		
	77				EMI411-417		
	78				EMI421-427		
	79				EMI431-435		
	80				406		
	81				EMI511-524		
	82				EMI531-538		
	83				EMI601,602		
	84				EMI611-626		
	85				EMI701-704		
	87						
	3	3	901550-56	RESISTOR 47 OHM 7-5% 1/4 WATT	EMI501-503		
		89					
		90					
	1	1	900462-27	CAPACITOR, 39PF, MLC, AXIAL, NPO	C703		
	1	1	900462-37	CAPACITOR, 100PF, MLC, AXIAL, NPO	C704		
		93					
	1	1	900463-16	CAPACITOR, 1000PF, MLC, AXIAL, X7R	C705		
	2	2	900463-23	CAPACITOR, 3900PF, AXIAL, X7R	C323,C333		
	2	2	900463-26	CAPACITOR, 6800PF, AXIAL, X7R	C322,C332		
		97					
	4	4	390082-02	CAPACITOR, .01UF, MLC, AXIAL, Z5U	C410,C412		
		98			C801,C713		
	4	4	900463-36	CAPACITOR, .047UF, MLC, AXIAL, X7R	C311-C314		
	17	17	390082-01	CAPACITOR, .1UF, MLC, AXIAL, Z5U	C7,C8,C10		
		102			C11-C13		
		103			C15,C33		
		104			C34-C37		
		105			C39,C321		
		106			C331,C701		
		107			C711		
		108					
		109					
		110					
		TH					

TITLE: commodore	DRAWN BY: S. KOZACHYN		DATE: 10/14/86	ENGR: APPR:	DATE:	SIZE: B	REV: 2	SHT: 4
	A500, PCB ASSEMBLY		CHKD:				312510	6

QUANTITY RECD. PER PART/DASH NO.	REV	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES	DATE		SIZE		REV	SHT
							CHKD	ENGR	DATE	DATE		
02 01												
32 32	112	390082-05	CAPACITOR, 22UF, M.C. AXIAL Z5U	C1-C6								
18	14			C16-C32								
14	16			C14, C40, C41								
16	17			C301, C302								
17	119			C305, C501								
2 2	118	390101-06	CAPACITOR, 10UF, ELECTROLYTIC, RADIAL	C502, C42								
5 5	120	390101-04	CAPACITOR, 22UF, ELECTROLYTIC, RADIAL	C303, C304								
11	122			C307, C324								
12	123			C334								
8 8	123	390101-01	CAPACITOR, 47UF, ELECTROLYTIC, RADIAL	C401, C402								
124	125			C812-C815								
126	127			C821, C822								
1 1	127	390101-02	CAPACITOR, 100UF	C811								
1 1	128	251029-06	VARIABLE CAPACITOR, 6.8-45PF	C702								
1 1	129	390239-01	TRANSISTOR, 2N5770 NPN OSC.	0701								
2 2	130	902658-01	TRANSISTOR, 2N3904, NPN G.P.	0501, Q711								
2 2	131	902707-01	TRANSISTOR, 2N3906, PNP G.P.	0502, 0503								
1 1	132	900850-01	DIODE, 1N4148	D501								
	133											
	134											
	135											
1 1	136	390229-01	VIDEO HYBRD	HY1								
1 1	137	251878-02	LINE FILTER, 8 PN	LF1								
1 1	138	901151-19	3.3 UH CHOKE	L701								
0 1	139	900556-11	CRYSTAL, 28.63636 MHZ	Y1								
	140											
1 0	141	900556-12	CRYSTAL, 28.37516 MHZ	Y1								
	142											
	143											
3 3	144	904150-06	SOCKET, 40 PIN DIP	U6, U7, U8								
3 3	145	251313-01	SOCKET, 48 PIN DIP	U3, U4, U5								
1 1	146	390185-01	SOCKET, 84 PIN PLCC	U2								
1 1	147	904150-10	SOCKET, 64 PIN DIP	U1								
S S	148	251313-02	SOCKET, 48 PIN DIP	U3, U4, U5								
TITLE: A500., PCB ASSEMBLY						SUBSTITUTE FOR ITEM 145				312510		2 5
commodore						DRAWN BY: S.KOZACHYNI		DATE 10/22/88		ENGR: ---		REV 2
						CHKD: ---		APPR: ---		SIZE B		SHT 6

PART NO.	DESCRIPTION	REVISIONS			
		LTRIZONE	DESCRIPTION	DATE	APPROVED
312604-01	A501 RAM/CLOCK EXP., PCB ASS'Y	1	ADVANCED ENGINEERING RELEASE	7/18	<i>JSP</i>
		2	PILOT PRODUCTION RELEASE		

1. SHEET 1 OF 3 SIZE C
ASSEMBLY DWG.

NOTES:

commodore	TITLE:	A501 RAM/CLOCK EXP., PCB ASS'Y	DATE ENGR:	DATE APPR:	SIZE	DRAWING NO.	312604
	DRWN BY:	S.KOZACHYN	CHKD:		B		SHEET 1 OF 3

QUANTITY REQD PER PART/DASH NO.	ITER	DS	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES	TITLE: A501 RAM/CLOCK EXP., PCB ASS'Y		
								DATE	SIZE	REV
	01									
	1									
	2	R	312511-01	PCB SCHEMATIC						
	3	R	312512-01	PCB FABRICATION DRAWING						
	4	R	312513-01	PCB ARTWORK						
	5									
	6									
	7									
	8		390026-01	IC, DRAM, 256K X 1, 150 NS						
	9		318073-01	IC, REALTIME CLOCK, OKI MSM6242B	U48-U63					
	10				U9					
	11		380393-01	BATTERY, NICAD, 3.6V, 60 MAH	BT1					
	12		900560-01	CRYSTAL, 32.768 KHZ	Y2					
	13		380311-05	HEADER, FEMALE, DUAL, RA, 56 POS.	CNY					
	14									
	15									
	16		390082-05	CAP, AXIAL, MLC, Z5U, .22UF						
	17		390082-01	CAP, AXIAL, MLC, Z5U, .1UF	C48-C63					
	18		390082-02	CAP, AXIAL, MLC, Z5U, .01UF	C914					
	19		900462-21	CAP, AXIAL, MLC, NPO, 22PF	C901					
	20				C911					
	21		390101-01	CAP, RADIAL, ELECTROLYTIC, 47UF						
	22		390101-05	CAP, RADIAL, ELECTROLYTIC, 4.7UF	C902,903					
	23		251029-06	CAP, VARIABLE, 6.8-45PF	C913					
	24				C912					
	25									
	26		900850-01	DIODE, 1N4148						
	27		902422-06	RESISTOR NTWK, 68 OHM PARALLEL X 4, 8 PIN	D911-D912					
	28		390227-05	RESISTOR NTWK, 68 OHM PARALLEL X 5, 10PIN	RP902-903					
	29		901550-58	RESISTOR, 470 OHM, 5%, 1/4 WATT	RP901					
	30		901550-20	RESISTOR, 10K OHM, 5%, 1/4 WATT	R911, R913					
	31				R912					
	32									
	33									
	34									
	35									
	36									
	37									

commodore

DRAWN BY:
S.KOZACHYN

DATE: 11-13-88
ENGR:
APPR:

DATE: _____
SIZE: B
REV: 2

SHT: 2
REV: 2
3

LTR		ZONE		REVISIONS		
				DESCRIPTION	DATE	APPROVED
1				ADVANCE ENGINEERING REL.		
2				PILOT PRODUCTION RELEASE		

PART NO.	DESCRIPTION
312587-01	MAIN ASSEMBLY - U.S./CANADA
- 02	GERMANY/AUSTRIA
- 03	FRANCE/BELGIUM
- 04	ITALY
- 05	SWEDEN/FINLAND
- 06	SPAIN/SOUTH AMERICA
- 07	DENMARK
- 08	SWITZERLAND
- 09	NORWAY
- 10	NETHERLANDS
- 11	ICELAND
312587-12	MAIN ASSEMBLY - U.K.

1. SHEET 3 OF 3 SIZE D

ASSY DWG
NOTES:

commodore	TITLE	MAIN ASSY.		AMIGA - A500
	DRAWN BY	7. COLBY	DATE	1-17-86
	CHKD		ENGR/MAN/ELC	APPR
			SIZE	B
			DRAWING NUMBER	312587
			SHEET	1 OF 3

QUANTITY RECD PER PART / DASH NO.			ITEM NO	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES
12	11	10						
1	1	1	1	312591-01	RAM EXP. DOOR			
1	1	1	2					
1	1	1	3	312592-01	RATING LABEL & SERIAL NO.			
1	1	1	4					
4	4	4	5	450150-03	RUBBER FEET			
1	1	1	6					
1	1	1	7	312505-01	TOP CASE			
1	1	1	8					
1	1	1	9	380133-03	PLATE, LOGO			
1	1	1	10					
1	1	1	11	312595-01	COVER, EXPANSION			
1	1	1	12					
1	1	1	13	312514-01	BOTTOM CASE ASS'Y. - U.S./CANADA			
1	1	1	14	02	- GERM./AUST.			
1	1	1	15	03	- FRAN./BELG.			
1	1	1	16	04	- ITALY			
1	1	1	17	05	- SWED./FINL.			
1	1	1	18	06	- SPAIN/S.A.			
1	1	1	19	07	- DENMARK			
1	1	1	20	08	- SWITZERLAND			
1	1	1	21	09	- NORWAY			
1	1	1	22	10	- NETHERLANDS			
1	1	1	23	11	- ICELAND			
1	1	1	24	312514-12	BOTTOM CASE ASS'Y. - U.K.			
1	1	1	25					
1	1	1	26					
1	1	1	27					
6	6	6	28	390146-01	SCREW TORQUE # 5 X 3/8 LG. STEEL			
1	1	1	29					
1	1	1	30					
1	1	1	31					
1	1	1	32					
1	1	1	33					
1	1	1	34					
1	1	1	35					
1	1	1	36					
1	1	1	37					

TITLE: COMMODORE	TITLE: MAIN ASSY.	DRAWN BY: J. COLLEY	DATE: 11-18-80	ENGR: M. MESTELLE	DATE: 11-18-80	SIZE: B	REV: 2	SHT: 3
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QUANTITY REQD PER PART/ DASH NO.		ITEM	Q'S	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES												
									12	11	10	09	08	07	06	05	04	03	02	01
1	1	1	1	1	1	1	1	1	312506-01	BOTTOM CASE										
1	1	1	1	1	1	1	1	1	312504-01	TOP SHIELD										
1	1	1	1	1	1	1	1	1	312589-01	INSULATION SHEET										
1	1	1	1	1	1	1	1	1	312590-01	BOTTOM SHIELD										
1	1	1	1	1	1	1	1	1	312594-01	DISK DRIVE ASSEMBLY - CHINON										
5	5	5	5	5	5	5	5	5	312594-02	DISK DRIVE ASSEMBLY - PANASONIC										
									312510-01	PCB ASSEMBLY - NTSC										
1	1	1	1	1	1	1	1	1	312510-02	PCB ASSEMBLY - PAL										
1	1	1	1	1	1	1	1	1	327038-01	RF SHIELD EXPANSION										
1	1	1	1	1	1	1	1	1	312502-01	KEYBOARD ASSY - US/CANADA										
4	4	4	4	4	4	4	4	4	390146-01	SCREW, TORQUE #5 X 3/16 LG - STEEL										
3	3	3	3	3	3	3	3	3	906800-05	SCREW, METRIC M3X6 - STEEL										

commodore					TITLE: BOTTOM CASE ASSEMBLY AMISA - A.520		DRAWN BY: T. CALSY		DATE: 1-788		ENGR: T. CALSY		DATE: 1-17-82		SIZE: B	REV: 3		SHT: 3	
						312514													

Drive
JU 363-282 3.5"

DRIVE PHYSICAL SPECIFICATIONS

GENERAL

The section contains the mechanical dimensions and mounting recommendations for the JU-3X3.

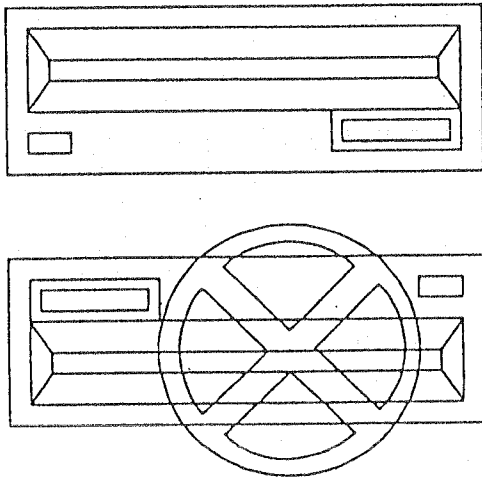
MOUNTING

NOTE

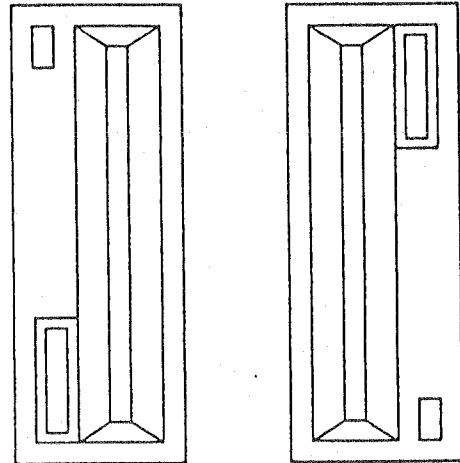
DO NOT MOUNT HORIZONTALLY WITH PCB UP
DO NOT MOUNT VERTICALLY WITH FRONT BEZEL UP/DOWN

The drive is capable of being mounted in either of the following positions

- Front Loading
- mounted vertically with door opening left or right.
 - mounted horizontally with PCB down.



HORIZONTAL



VERTICAL

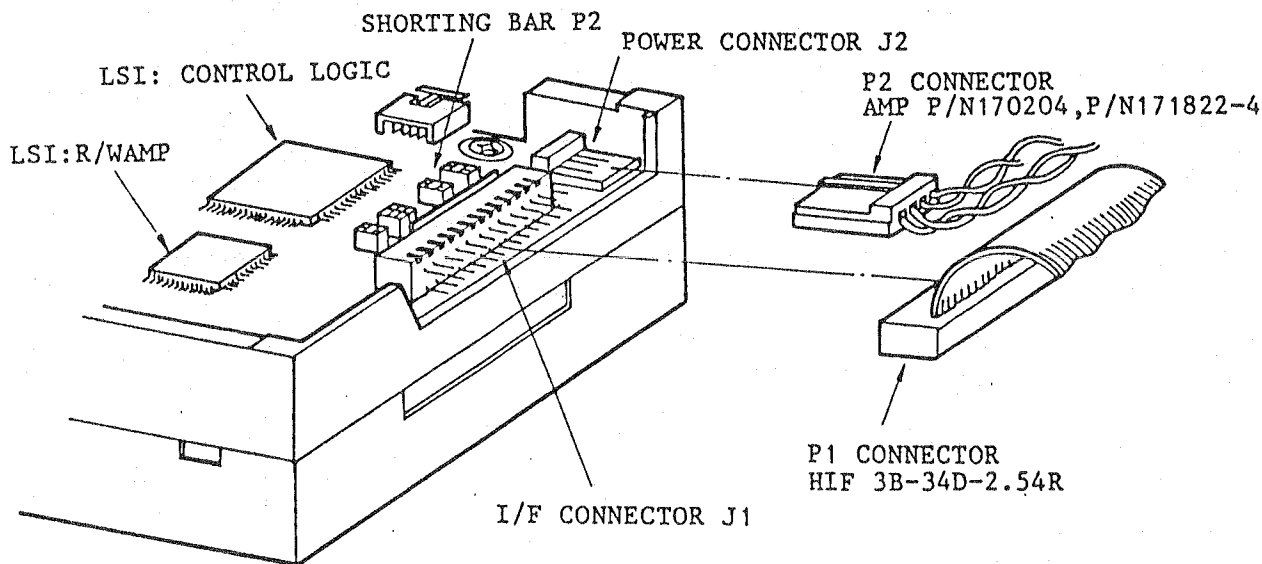
RECOMMENDED MOUNTING POSITIONS

PHYSICAL INTERFACE

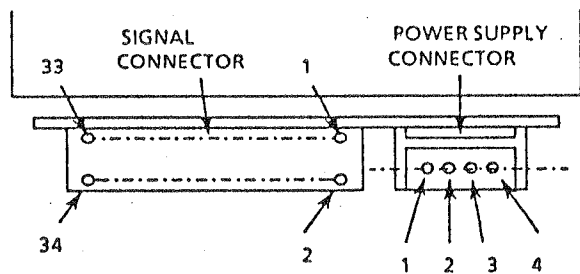
INTRODUCTION

The electrical interface between the JU-3X3 and the host system is via two connectors. The first connector, J1, provides the signal interface and the second connector, J2, provides the dc power.

This section describes the physical connectors used on the drive and the recommended connectors to be used with them.



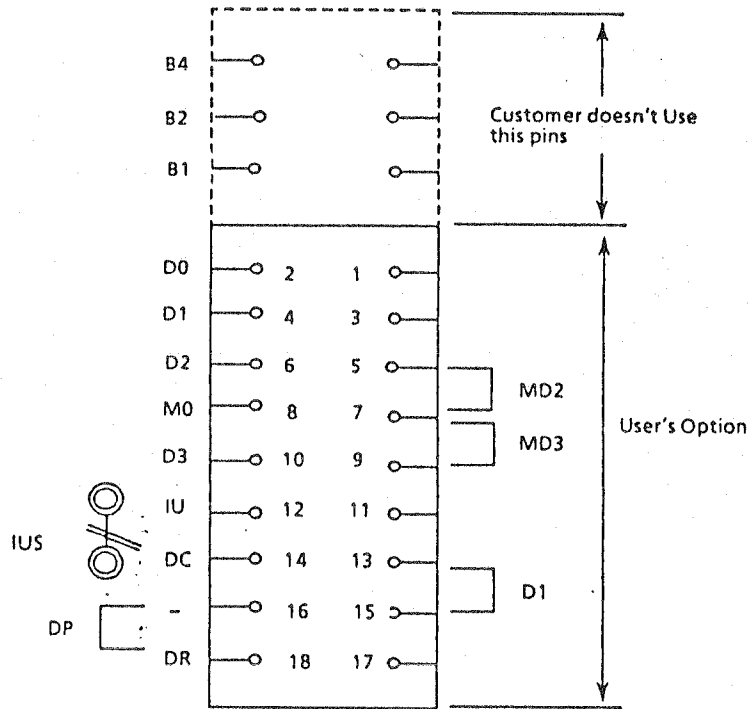
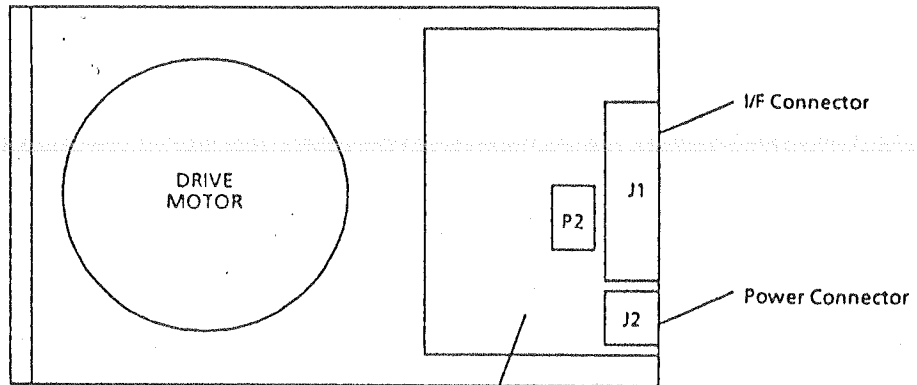
INTERFACE CONNECTORS LOCATIONS



J2 CONNECTOR PIN

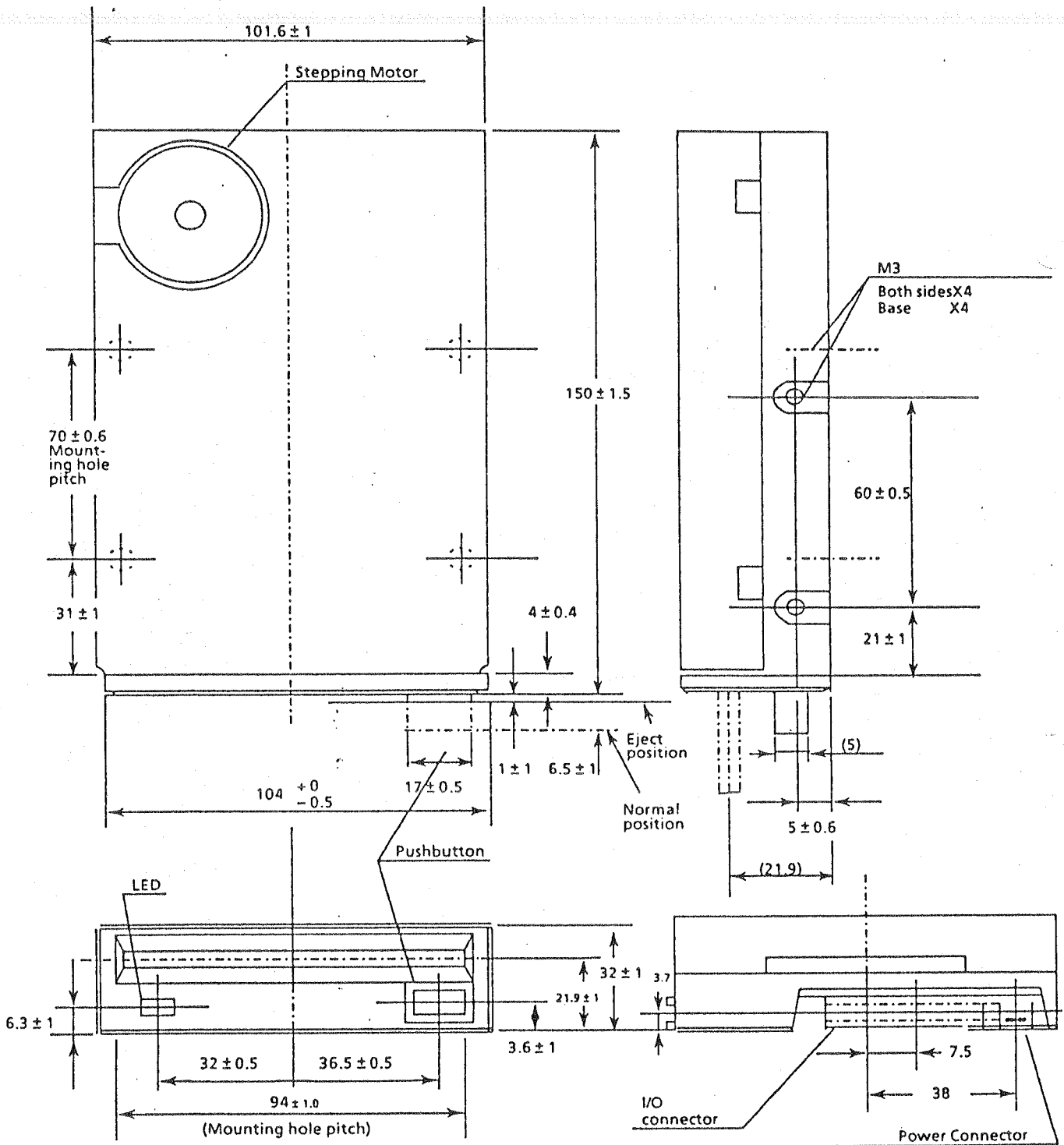
1	+ 5 VDC
2	+ 5 RETURN
3	+ 12 RETURN
4	+ 12 VDC

J1/J2 CONNECTOR



SHORTING BAR P2 PIN ASSIGNMENT

MECHANICAL DIMENSIONS



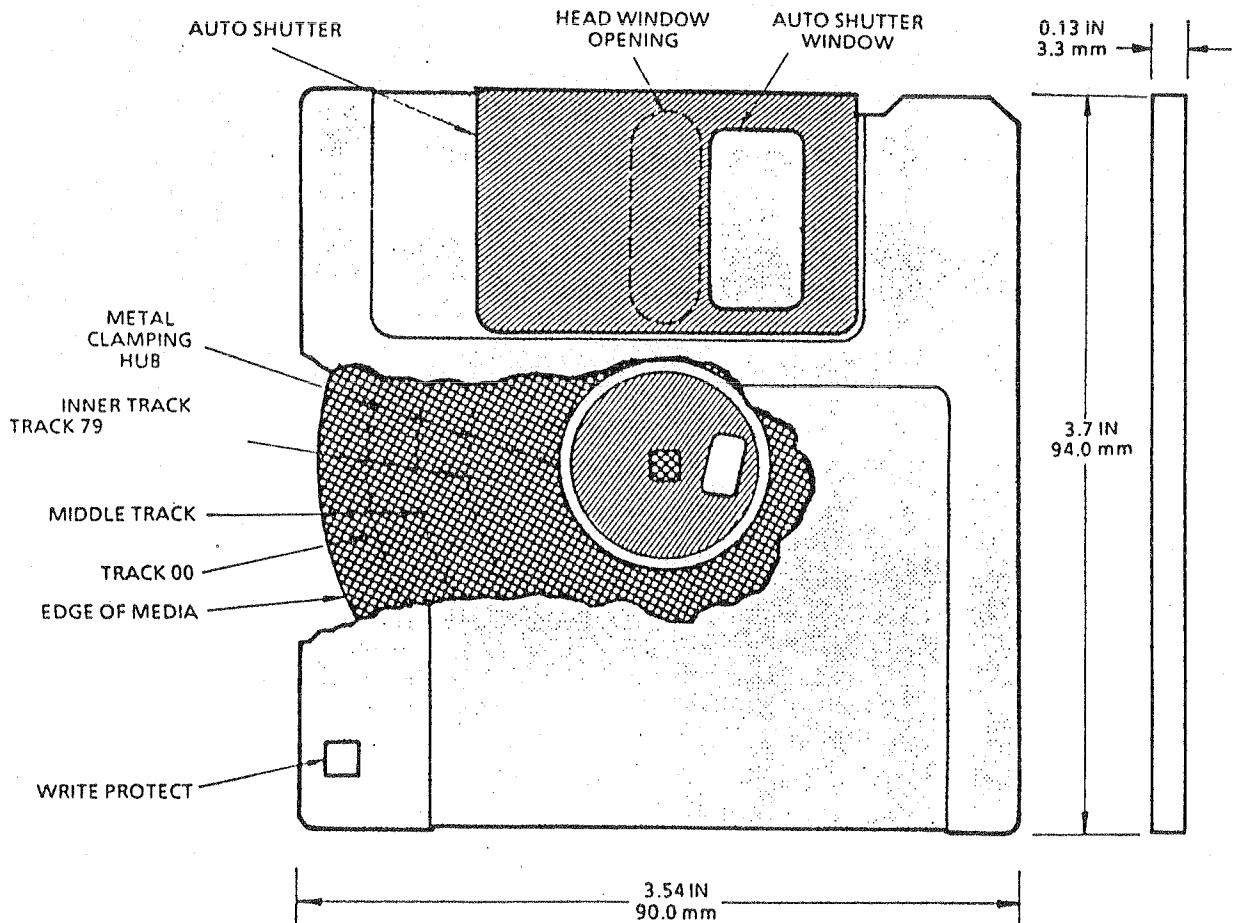
Back View

MECHANICAL DIMENSIONS

MICROCARTRIDGE HANDLING

To protect the cartridge, the same care and handling procedures specified for computer magnetic tape apply. These precautionary procedures are as follows:

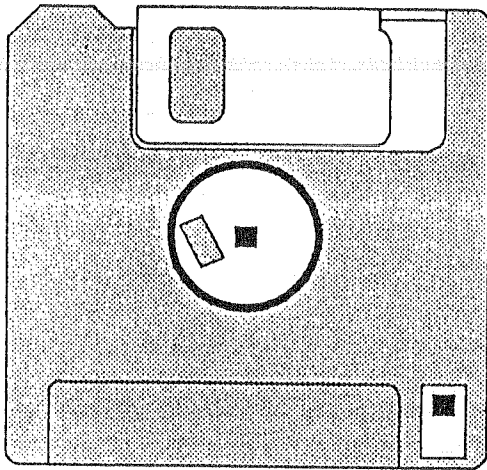
- a. Cartridges not intended for immediate use should be stored in the box.
- b. Keep cartridges away from magnetic fields and from ferromagnetic materials which might become magnetized. Strong magnetic fields can distort recorded data on disk.
- c. Place ID labels in correct location, never use in reverse.
- d. Do not use erasers.
- f. Heat and contamination from carelessly dropped ash could damage disk.
- e. Do not expose cartridge to heat or sunlight.



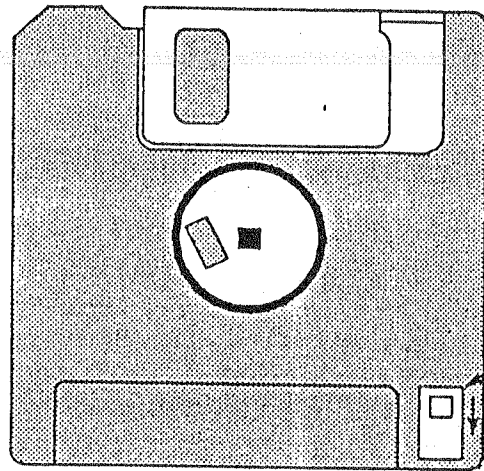
MICROCARTRIDGE NOMENCLATURE

WRITE PROTECT FEATURE

The microcartridge comes with a mechanical write protect tab. To write protect the cartridge, turn the mechanical tab as shown in figure 8-3 to uncover the write protect hole.



WRITE ENABLED
HOLE CLOSED



WRITE
PROTECT
HOLE

SLIDE MECHANICAL TAB
AS SHOWN TO OPEN HOLE
WRITE PROTECTED

BOTTOM VIEW

WRITE PROTECT OPERATION

ELECTRICAL INTERFACE

INTRODUCTION

The interface of the JU-3X3 can be divided into two categories.

- a. Signal Lines
- b. Power Lines

The following paragraphs provide the electrical definition for each line. See figure 2-1 for all interface connections.

SIGNAL INTERFACE

The signal interface consists of two categories:

- a. Control Lines
- b. Data Transfer Lines

All lines in the signal interface are digital in nature and provide signals to the drive (input) or to the host (output) via interface connector P1/J1.

Input Lines

The input signals are of three types: those intended to be multiplexed in a multiple drive system, those which will perform the multiplexing, and those signals which are not multiplexed and affect all the drives in a daisy chain system.

The input signals to be multiplexed are:

- a. DIRECTION SELECT
- b. STEP
- c. WRITE DATA
- d. WRITE GATE
- e. SIDE SELECT (JU-363 only)

The input signals which are intended to do the multiplexing are:

- a. DRIVE SELECT 0
- b. DRIVE SELECT 1
- c. DRIVE SELECT 2
- d. DRIVE SELECT 3

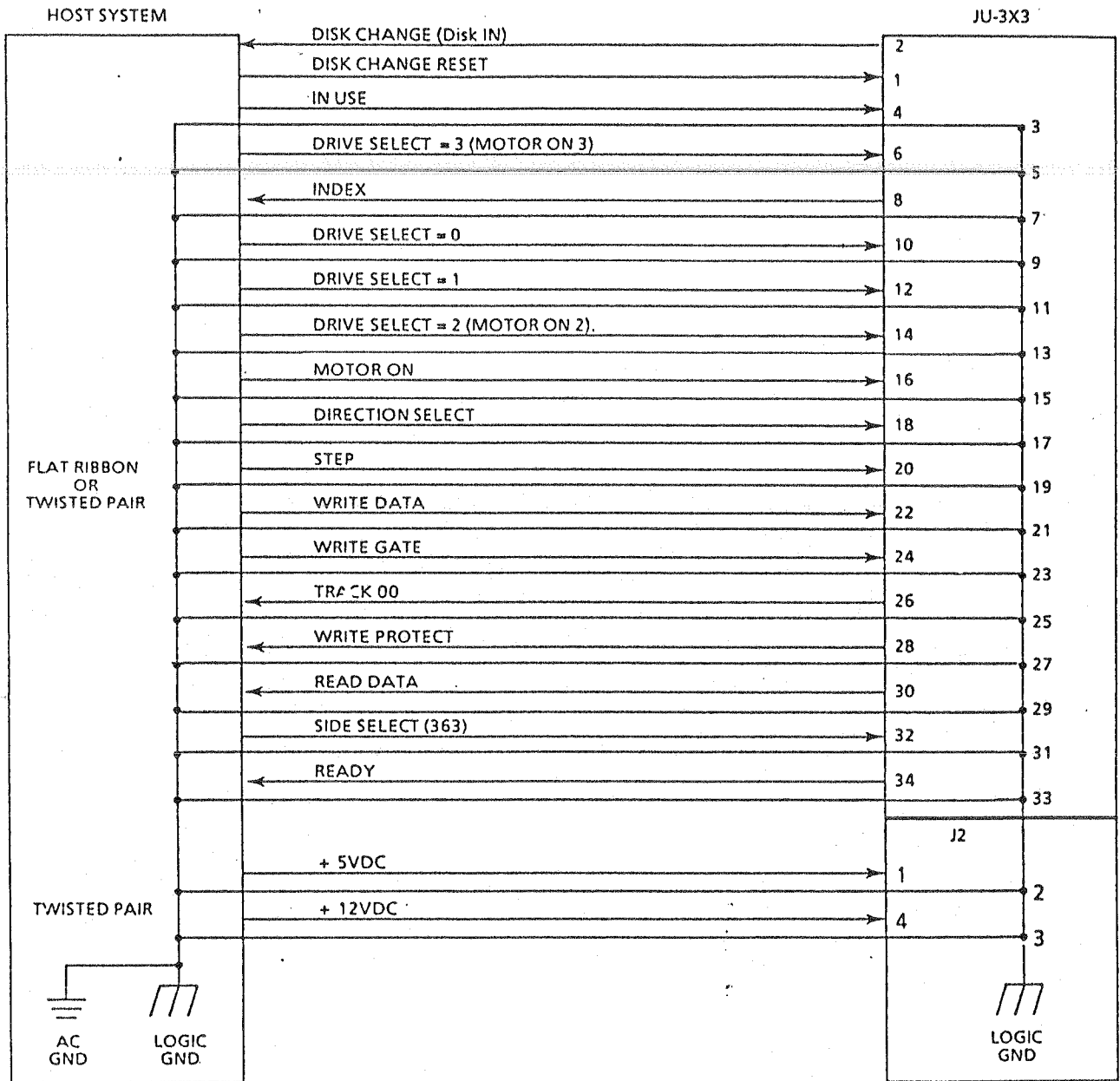
The signals which are not multiplexed are IN USE and MOTOR ON.

The input lines have the following electrical specifications. See figure 2-2 for the recommended circuit.

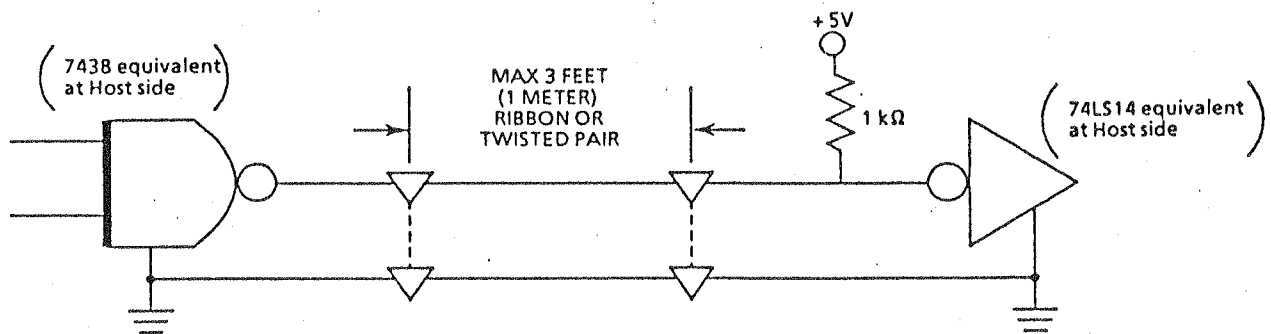
True = Logical zero = $V_{in} + 0.0$ to $+0.8V$ @ $I_{in} = 6$ mA (max.)

False = Logical one = $V_{in} + 2.4$ to $+5.25V$ @ $I_{in} = 250$ μA (open)

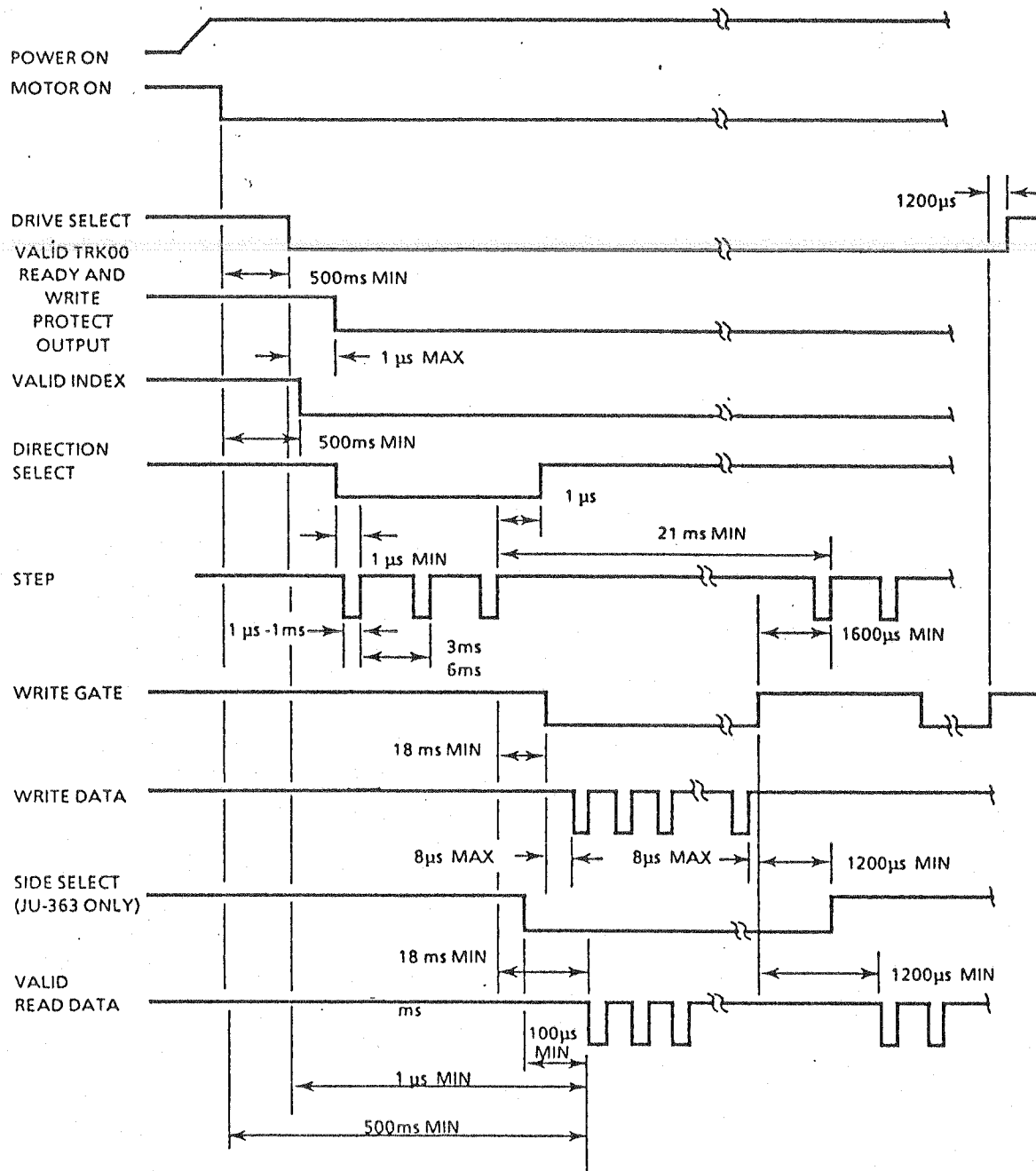
Input impedance = 1 k ohms



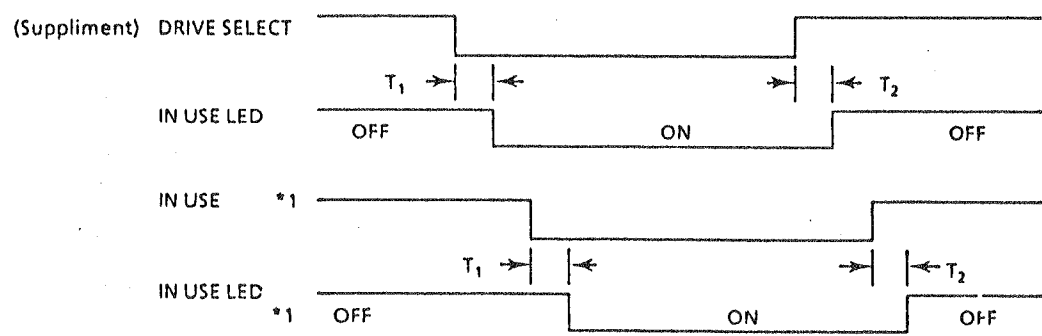
INTERFACE CONNECTIONS



INTERFACE SIGNAL DRIVER/RECEIVER



GENERAL CONTROL AND DATA TIMING REQUIREMENT



*1) PIN11 & 12 (Pin Post P2 on PCB) shorted. $T_1, T_2 \leq 0.5ms$

Input Line Termination

The JU-3X3 has been provided with the capability of terminating the seven input lines (eight input lines at JU-363) listed below.

- a. MOTOR ON
- b. DIRECTION SELECT
- c. STEP
- d. WRITE DATA
- e. WRITE GATE
- f. IN USE
- g. SIDE SELECT (for JU-363 only)
- h. DISK CHANGE RESET

These lines are terminated through 1 k ohm resistor arrays installed on all PCB.

In a single drive system, this resistor array provides 1 k ohm input impedance for input lines. In a multiple drive system, the input impedance is varied in value from 250 ohms to 500 ohms depending on the number of used drives.

Drive Select 1 - 4

Four separate input lines (DRIVE SELECT 0 through DRIVE SELECT 3) are provided so that up to four drives in a multiplexed system may have separate input pins. Only the drive with a unique DRIVE SELECT line active will allow the drive to respond to multiplexed input lines and enable the outputs to drive their respective signal lines. A logical zero on the interface selects a unique drive select line for the drive.

Motor ON

This input, when activated to a logical zero level, will turn on the drive motor allowing reading or writing on the drive. A 0.5-second delay after activating this line must be allowed before reading or writing.

Direction Select

This interface line defines the direction of motion the read/write head(s) will take when the STEP line is pulsed. An open circuit, or logical one, defines the direction as "out". If a pulse is applied to the STEP line, the read/write head(s) will move away from the center of the disk. Conversely, if this input is shorted to ground or a logical zero level, the direction of motion is defined as "in". If a pulse is applied to the STEP line, the read/write head(s) will move towards the center of the disk.

Side Select (JU-363 only)

This interface line defines which side of a two-sided diskette is used for reading or writing. An open circuit, or logical one, selects the read/write head(s) on the side 0 surface of the diskette. A short to ground, or a logical zero, selects the read/write head on the diskette's side 1 surface. When switching from one head to the other a 100 μ s delay is required before any read or write operation can be initiated.

Step

This interface line is a control signal which causes the read/write head(s) to move in the direction of motion defined by the DIRECTION SELECT line. This signal must be a logical zero-going pulse with a minimum pulse width of 1 μ s. Each subsequent pulse must be delayed by 3 ms (JU-323, 363), 6 ms (JU-313) minimum from the preceding pulse for normal mode.

The access motion is initiated on each logical zero to logical one transition, or at the trailing edge of the signal pulse. Any change in the DIRECTION SELECT line must be made at least 1 μ s before, and must be maintained 1 μ s after the trailing edge of the step pulse. See Figure 1-3 for these timers.

Write Gate

The active state of this signal, or logical zero, enables write data to be written on the diskette. The inactive state, or logical one, enables the read data logic and stepper logic. See figure 1-8 for timing.

Write Data

This interface line provides the data to be written on the diskette. Each transition from a logical one level to a logical zero level will cause the current through the read/write head to be reversed, thereby writing a data bit. This line is enabled by WRITE GATE being active. WRITE DATA must be inactive during a read operation. See Figure 1-9 for timings.

In Use

Normally, the activity LED on the selected drive will turn on when the corresponding DRIVE SELECT signal is active. The IN USE input instead of the DRIVE SELECT signal can activate the LED too.

Output Lines

The output control lines have the following electrical specifications. See figure 2-2 for the recommended circuit.

True = Logical zero = $V_{out} + 0.0$ to $+0.4V$ @ $I_{out} = 6$ mA (max)

False = Logical one = $V_{out} + 2.4$ to $+5.25V$ (open collector) @ $I_{out} = 250$ μ A (max)

Track 00

The active or logical zero state of this interface signal indicates when the read/write head of the drive is positioned at track zero (the outermost track) and the stepper is locked on track. This signal is at a logical one level, or inactive state, when the read/write head is not at track 00. When the reads/write head is at track 00 and an additional step out pulse is issued to the drive, LSI logic will keep the read/write head positioned at track 00.

Index

This interface signal is provided by the drive each motor revolution. Normally, this signal is at a logical one level and makes the transition to the logical zero level each time a reflector is sensed.

With soft sectored media, there is one pulse on this interface signal per revolution of the diskette (200 ms). This pulse indicates the physical beginning of a track. See figure 3-4 for timing.

When using the INDEX signal, look for an edge or transition rather than a level for determining the status.

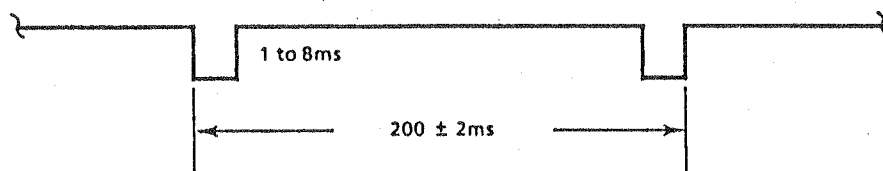


FIGURE 2-4' INDEX TIMING

Read Data

This interface line provides the "raw data" (clock and data together) as detected by the drive electronics. Normally, this signal is a logical one level and becomes a logical zero level for the active state. See Figure 1-6, 1-7 for the timing.

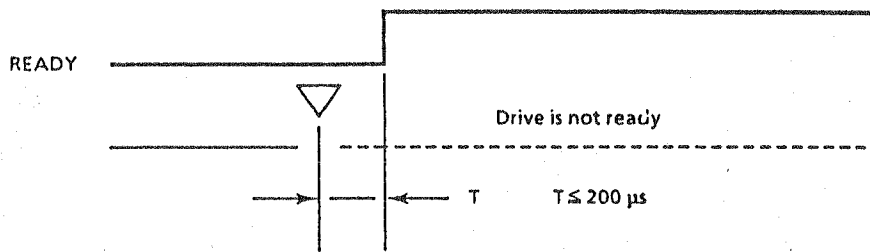
Write Protect

This interface signal is provided by the drive to indicate to the user that a write protected cartridge is installed. The signal is logical zero level when it is protected. The drive will inhibit writing with a protected diskette installed and, additionally, notifies the interface.

Ready

This interface line provides information on the status of the drive that allow the controller to operate, all the functions of the drive under the following conditions.

- a. A cartridge is inserted in the drive.
- b. The motor is on and up to speed.
- c. DC power is supplied to the drive.

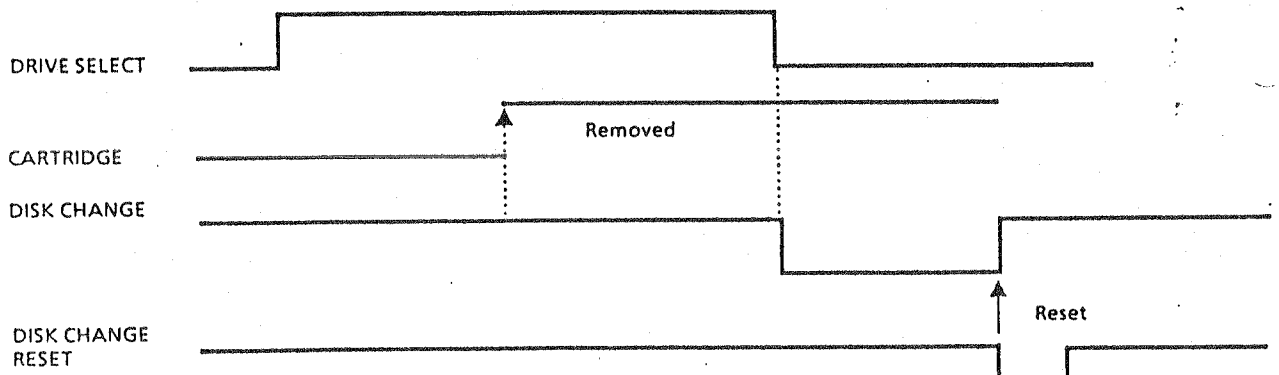


Disk Change (and Disk Change Reset)

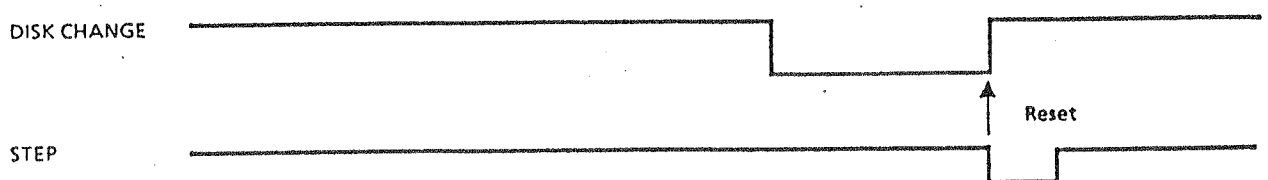
This interface signal is provided by the drive to indicate the condition that disk cartridge is ejected while the drive is deselected, and output when DRIVE SELECT line is activated.

This Disk Change line can be reset with Disk Change Reset, adding to this, if the shorting pin 16 and 18 are shorted STEP signal can reset this signal.

- 1) Shorting bar DR (Pin 17, 18) is shorted.

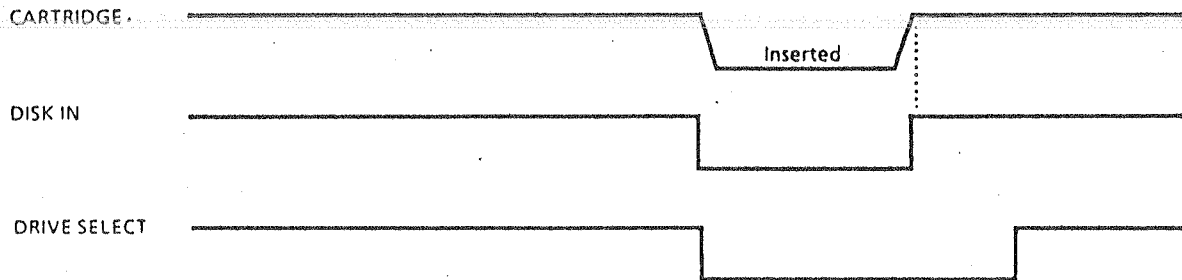


- 2) Shorting bar (Pin 16,18) is shorted.



Disk In (Option)

This signal is output for stating the condition of cartridge inserted. When the shorting pin 13 and 15 rather than 13 and 14, are shorted with shorting plug.



Normally, the drive is shipped at shorting pin 13 and 15 being shorted.

POWER INTERFACE

The JU-3X3 required only dc power for operation. DC power to the drive is provided via J2 located on the component side of the PCB. The two dc voltages, their specifications and their J2 pin designations are outlined in table 2-1. The specifications outlined on current requirements are for one drive. For multiple drive systems, the current requirements are a multiple of the maximum current times the number of drives in the system. Figure 2-5 illustrates the JU-3X3 dc power profile.

FRAME GROUND AND SIGNAL GROUND

The aluminum base plate of the drive is at the same electrical level as signal ground. Only the mounting bracket is contracted to the frame ground. This provides protection against radiation noise from outer systems.

TABLE 2-1. DC POWER REQUIREMENTS

J2 PIN	DC VOLTAGE	TOLERANCE	CURRENT	MAX RIPPLE (p to p)
1	+ 5 VDC	± 0.25 VDC	0.25 A MAX 0.22 A TYP	50 mV MAX ALLOWABLE
2	+ 5 RETURN			
3	+ 12 RETURN			
4	+ 12 VDC	± 1.2 VDC	0.21 A MAX 0.12 A TYP	100 mV MAX ALLOWABLE

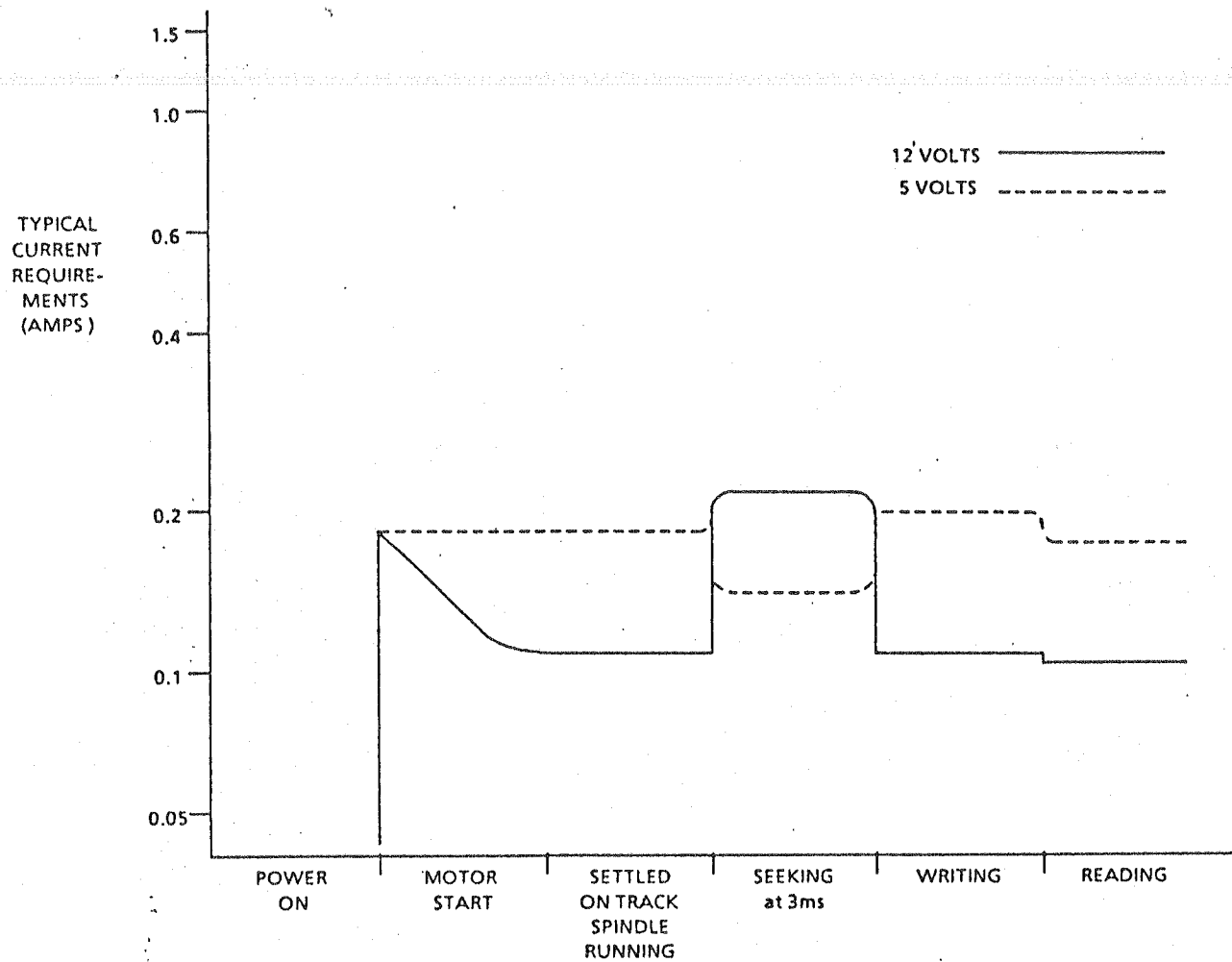
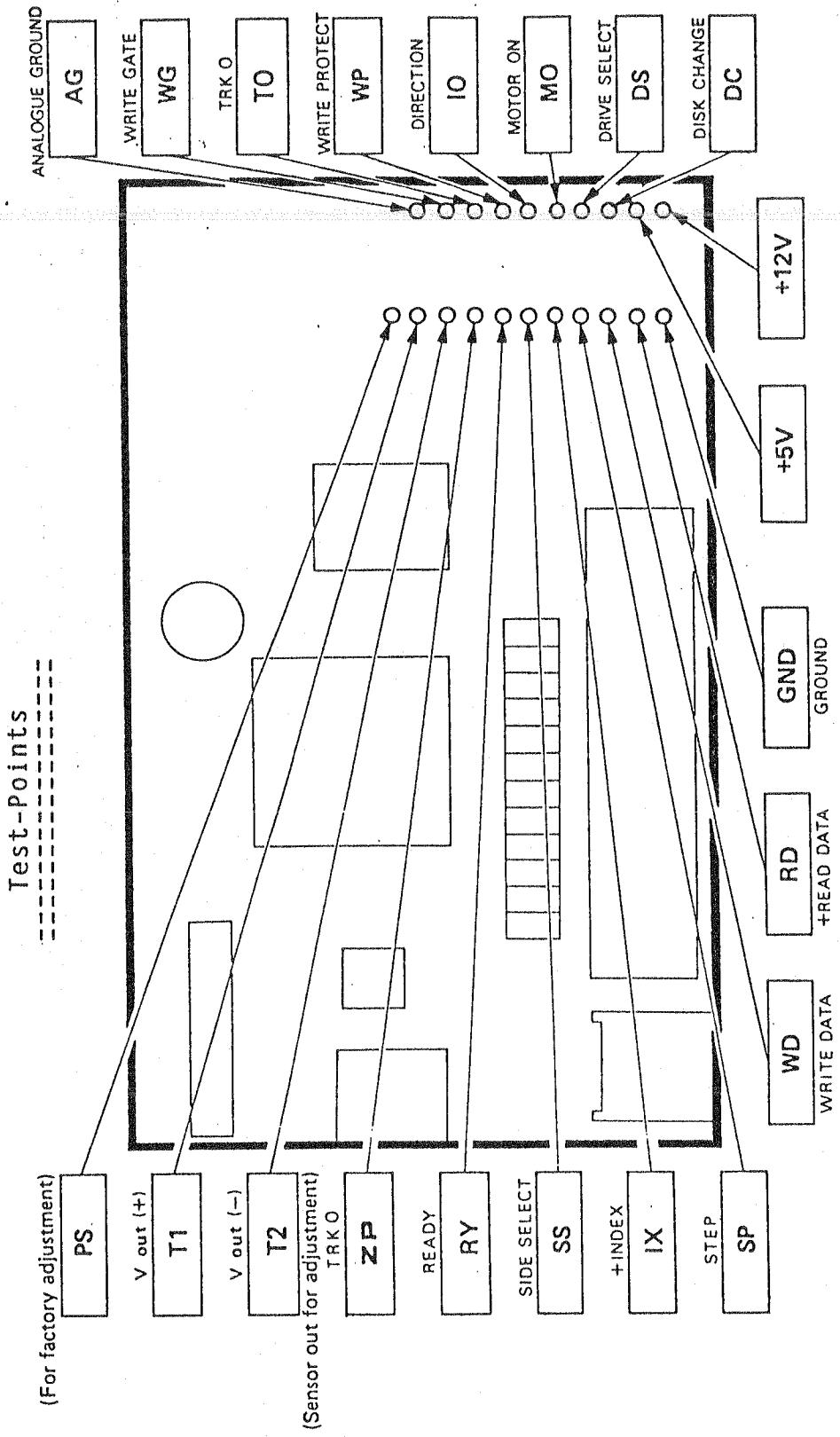


FIGURE 2-5 DC POWER PROFILE



Radial Alignment

Normally, this adjustment is not necessary.

If the stepping motor mounting screws have loosened, or if parts have been damaged, or if a compatibility error has occurred, check and re-adjust as follows:

Steps 1 through 4 apply to both the CE and DAD types, except that alignment diskettes are different between them.

1. Insert an alignment diskette.

Caution: Be sure to leave the alignment diskette indoors for 20 minutes before starting radial alignment.

2. Step to track 40.

3. Synchronize oscilloscope on IX (- INDEX), and set time base to 20 ms/division. One revolution will be displayed.

4. Connect one probe to T1 and the other to T2. Ground the probes to GND and AG. Set inputs to AC, Add, and invert one channel. Set vertical deflection to 0.1 V/division (VARIABLE PULL) for the CE type, or to 2 mV/division for the DAD type.

• Cat's Eye Type

5. Check amplitude waveforms for Side 0 and Side 1. Waveforms such as shown in Fig. 4.2 can be seen.

6. The amplitude ratio of the two waveforms should be 60% or more. If it is not, adjust as follows:

7. Loosen the two stepping motor mounting screws.

8. Turn the stepping motor along the base by hand until the lobes of the two waveforms have approximately the same amplitude, and retighten the mounting screws. (See Fig. 4.2.)

9. Seek from track 0 to 40 and from track 79 to 40, and check that radial alignment is correct.

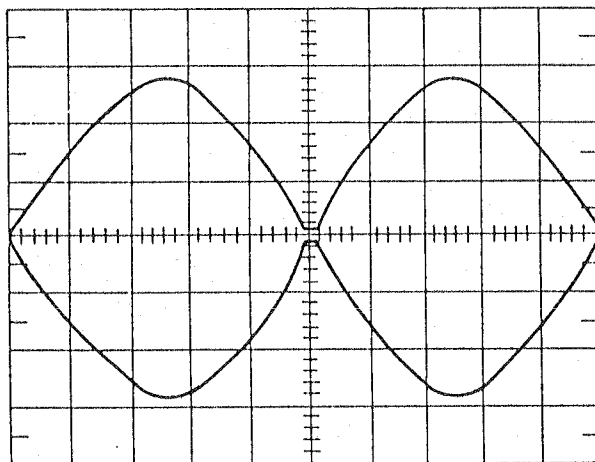
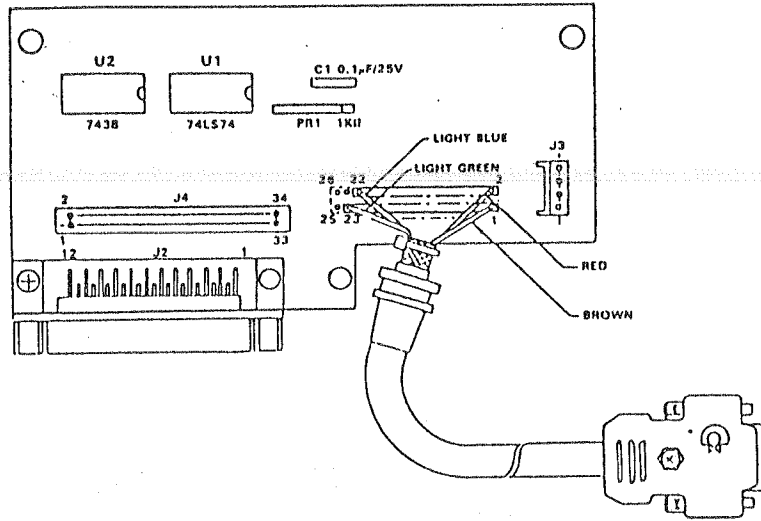
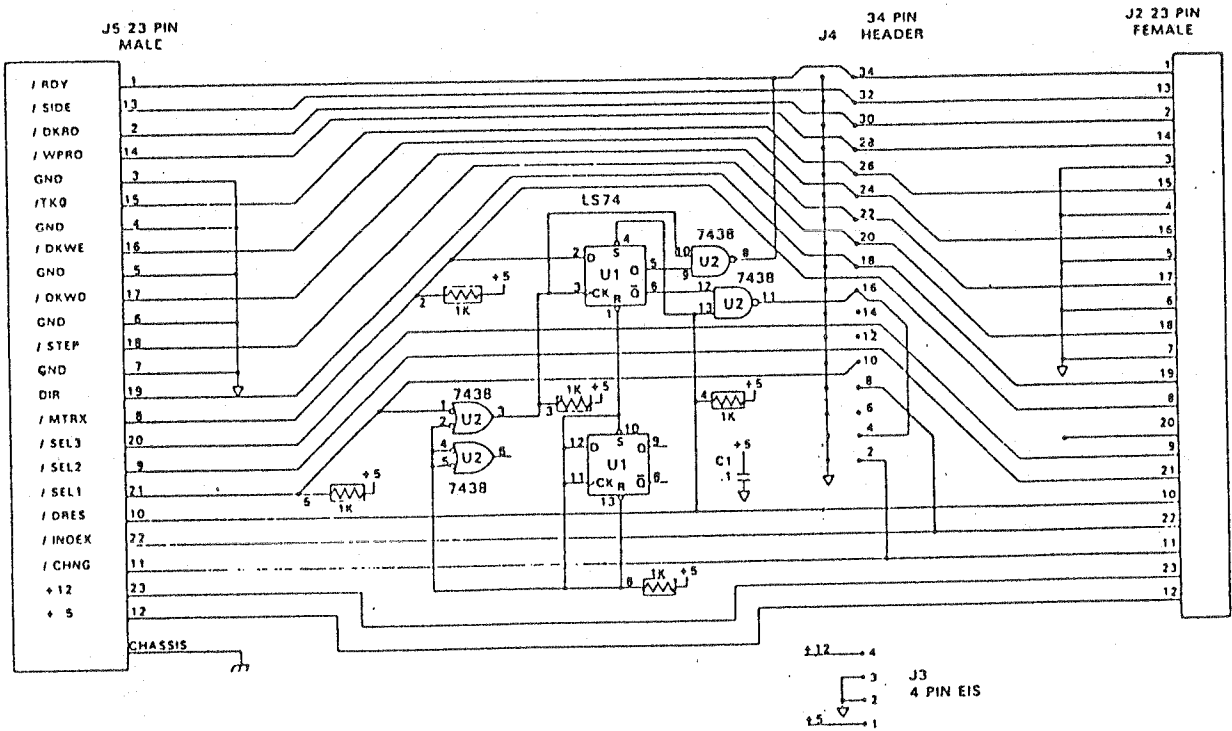


Fig. 4.2 Radial Alignment Waveforms (Cat's Eye)

INTERFACE PCB ASSY. #327204



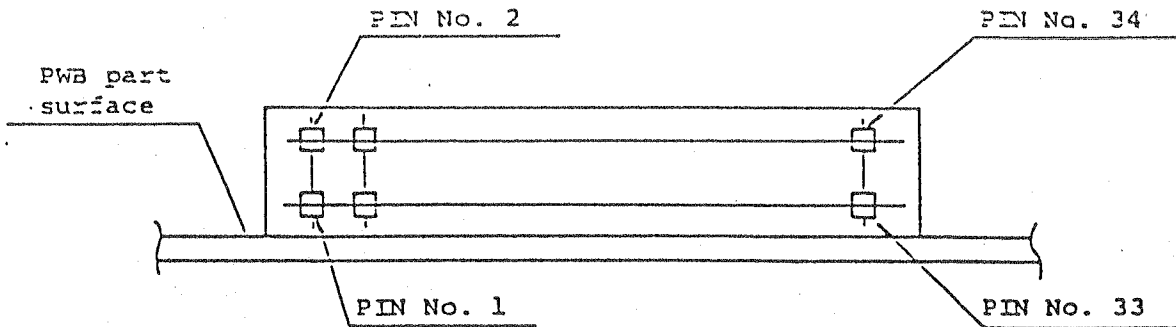
Board Layout



Interface Schematic

SIGNAL TYPES AND PIN CONFIGURATION

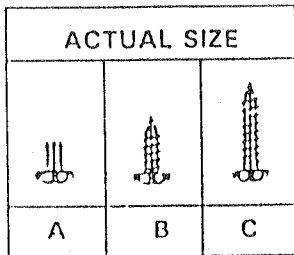
The following shows the signal connector pin configuration on the FD1035:



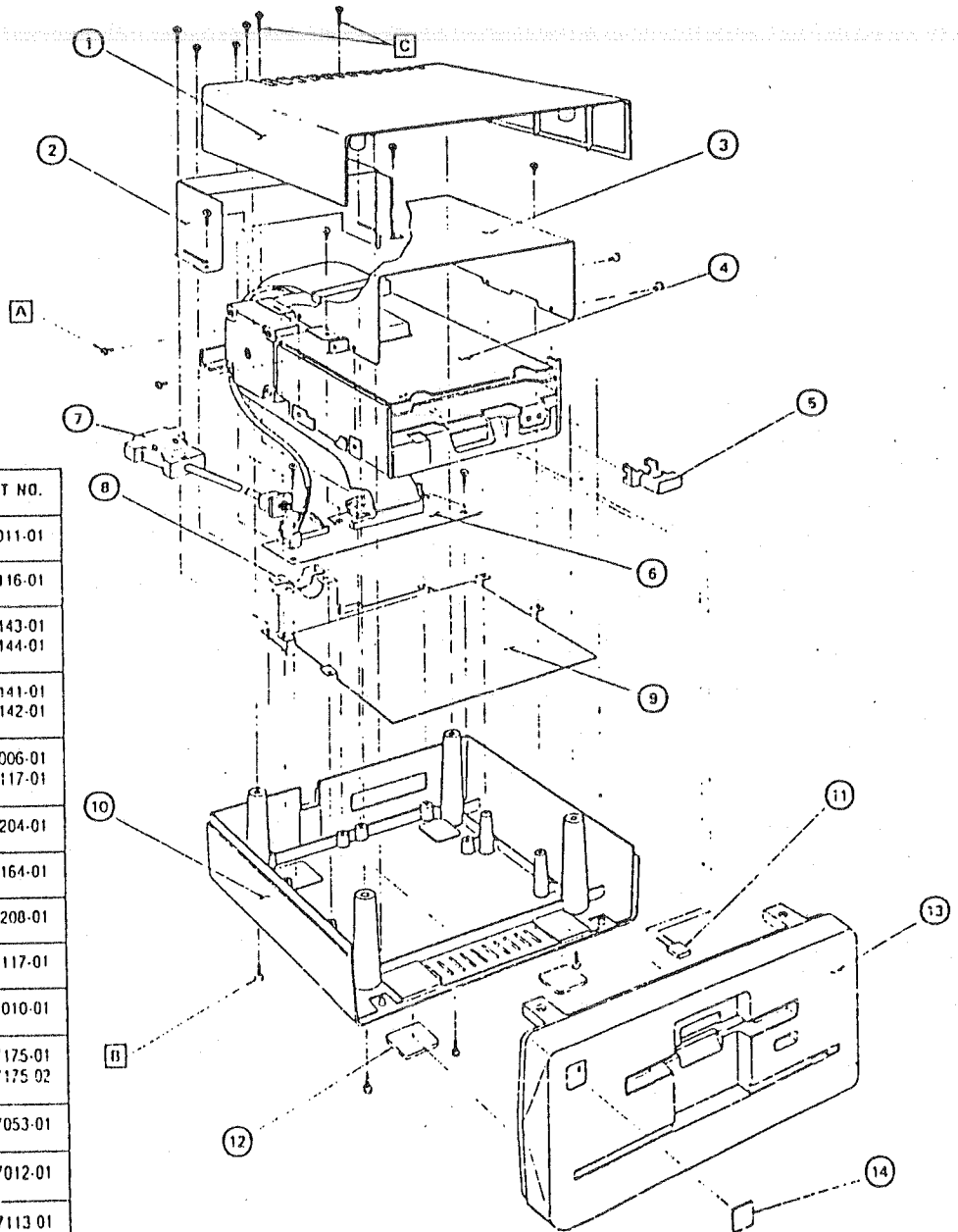
Signal name	I/O	Pin number	Pin number	Signal name
DISK CHANGE (IN USE)	Output signal	2	1	GND
DRIVE SELECT 3	Input signal	4	3	GND
INDEX	Output signal	6	5	GND
DRIVE SELECT 0	Input signal	8	7	GND
DRIVE SELECT 1	Input signal	10	9	GND
DRIVE SELECT 2	Input signal	12	11	GND
MOTOR ON	Input signal	14	13	GND
DIRECTION SELECT	Input signal	16	15	GND
STEP	Input signal	18	17	GND
WRITE DATA	Input signal	20	19	GND
WRITE GATE	Input signal	22	21	GND
TRACK 00	Output signal	24	23	GND
WRITE PROTECT	Output signal	26	25	GND
READ DATA	Output signal	28	27	GND
SIDE SELECT	Input signal	30	29	GND
READY	Output signal	32	31	GND
		34	33	GND

2. 3.5" EXTERNAL DRIVE DISASSEMBLY

2.1 ASSEMBLY OVERVIEW



POS.	DESCRIPTION	PART NO.
1	TOP CASE	327011-01
2	RFI TOP SHIELD	327116-01
3	DRIVE MTG BRACKET-NEC DRIVE MTG BRACKET-PANA	327143-01 327144-01
4	3.5" DRIVE ASSY-NEC 3.5" DRIVE ASSY-PANA	327141-01 327142-01
5	DISK EJECT BUTTON-NEC DISK EJECT BUTTON-PANA	327006-01 328117-01
6	INTERFACE PCB ASSY	327204-01
7	INTERFACE CABLE ASSY	327164-01
8	CABLE CLAMP ASSY	327208-01
9	RFI BOTTOM SHIELD	327117-01
10	BOTTOM CASE	327010-01
11	LED ASSY-NEC LED ASSY-PANA	327175-01 327175-02
12	RUBBER FOOT	327053-01
13	FRONT BEZEL	327012-01
14	NAMEPLATE-AMIGA LOGO	327113-01
PARTS NOT ILLUSTRATED:		
	RIBBON CABLE ASSY-DATA	327206-01
	CABLE ASSY-POWER	327297-01
	USERS INSTRUCTION SHEET	327202-01



Assembly Overview

THE MAJOR ASSEMBLIES IDENTIFIED

REVISIONS				
LTR	ZONE	DESCRIPTION	DATE	APPROVED
1		ADVANCE ENGINEER REL.	1.18.81	K.H.F.
2		PILOT PRODUCTION RELEASE		

PART NO.	DESCRIPTION
312594-01	DISK DRIVE ASSEMBLY - CHINDON
312594-02	DISK DRIVE ASSEMBLY - PANASONIC

1. SHEET 3 OF 3 SIZE C
 ASSY DWG
 NOTES:

commodore	TITLE	DISK DRIVE ASSEMBLY	AMIGA - A500	DRAWN BY	T. GALEY	DATE	11-26-81	ENGR.	H. MITTELLER	11-26-81	SIZE	B	DRAWING NUMBER	312594	SHEET	1	OF	3
				CHKD				APPR										

QUANTITY REQD PER PART / DASH NO.	ITEMS	Q'S	PART NUMBER	DESCRIPTION	REF DES	BEND	NOTES	TITLE		
								COMMODORE	DISK DRIVE ASSEMBLY AMIGA - A500	DATE
	02101									
	1	1	312554-01	3.5" FLOPPY DISK DRIVE - CHINON						
		2								
	1	3	327142-01	3.5" FLOPPY DISK DRIVE - PANASONIC						
		4								
	1	5	327206-03	CONNECTOR CABLE 125mm						
		6								
	2	7	907183-02	STAND-OFF M3 M/F HEX.						
		8								
	1	9	327207-02	POWER CABLE 125mm						
		10								
	1	11	328117-01	BUTTON - PANASONIC						
		12								
	1	13	906800-05	SCREW, METRIC - M3 X 6						
		14								
		15								
		16								
		17								
		18								
		19								
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		30								
		31								
		32								
		33								
		34								
		35								
		36								
		37								

DATE: 11-26-92
 ENGR: H. AMSTELLER
 APPR:

DATE: 11-26-92
 DRAWN BY: J. COLEY
 CHKD:

SIZE: B
 REV: 2
 SAT: 3

312594

PHYSICAL, Cont'd.

Connectors:

AC -

Shall meet the specifications in Commodore drawing 903508 - Power Cord International.

DC -

7 pin DIN circular male plug with key. Connector shield shall be clamped and soldered to the cable shield.

Refer to Figure 2 for detailed connector specifications and wire list.

Cable:

Five (5) conductor with copper braid (90% coverage). Refer to Figure 2.

Power Switch:

An externally accessible switch (SPST) shall be in series with the AC input.

ELECTRICAL

AC Input:

105 - 132 VAC (01) 198 - 242 VAC (02)
216 - 264 VAC (03,04)

AC Input Frequency:

57 - 63 Hz (01) 47 - 53 Hz (02, 03, 04)

DC Output Voltages:

+5.0VDC \pm 0.05 VDC
+12.0VDC \pm 0.6VDC
-12.0VDC \pm 0.6VDC

Output Current:

+5.0VDC = 4.5A maximum
+12.0VDC = 1.0A maximum
-12.0VDC = 0.1A maximum

Maximum Continuous Output Power:

Any combination within the following range is allowed such that the total power does not exceed 35 watts.

+5VDC -

30% to 100% rated load

+12VDC -

15% to 100% rated load

-12VDC -

15% to 100% rated load

Line, Load and Cross Regulation:

Measured at output connector with 30% to 100% rated load.

+5VDC -

\pm 5%

+12VDC -

\pm 10%

-12VDC -

\pm 10%

Refer to Table 2 for measurement procedure.

COMMODORE

TITLE

Power Supply, External -
Consumer Amiga

SIZE DRAWING NO.

312503

REV

SCALE

SHEET

ELECTRICAL, Cont'd.

Ripple and Noise:

+5VDC -

+12VDC -

-12VDC -

Overvoltage Protection:

+5VDC -

Overcurrent Protection:

Input Surge Protection:
(Varistor)

Efficiency:

Hold-up Time:

Transient Response:

Line Filter:

Input Current Protection:

No Load Input Current:

Dielectric Withstanding Voltage:

Refer to Table 2 for measurement procedure.

100 mV peak to peak

200 mV peak to peak

200 mV peak to peak

Refer to Table 2 for over shoot.

+6.0VDC minimum. +7.0VDC maximum.

The unit shall tolerate a short circuit (= 0.1 ohm) condition on any or all outputs for an indefinite duration without exceeding the case temperature requirements of regulatory agencies or 90°C whichever is lower.

3KV, 25 ampere for 3ms minimum.

50% minimum at nominal input, maximum loads.

16.67ms minimum at minimum AC input, 100% load.

200 μ s maximum for +5VDC output to stabilize after 5% change on 50% load.

AC input shall have an internal EMI line filter.

Turn-on inrush current not to exceed 20 ampere.

0.1 ampere maximum @ 117 VAC

0.05 ampere maximum @ 220 or 240 VAC

1,000 VAC for one (1) minute.

ENVIRONMENTAL

Operating Temperature:

0° to +50°C

Operating Humidity:

5 to 95% RH non-condensing

Operating Altitude:

0 to 3,000 meters

Storage Temperature:

-20° to +50°C

Storage Humidity:

5% to 95% RH non-condensing

Storage Altitude:

0 to 15,000 meters

Shock:

30g's 21 m seconds $\frac{1}{2}$ sine, two shocks in each of six (6) directions.

RELIABILITY

MTBF:

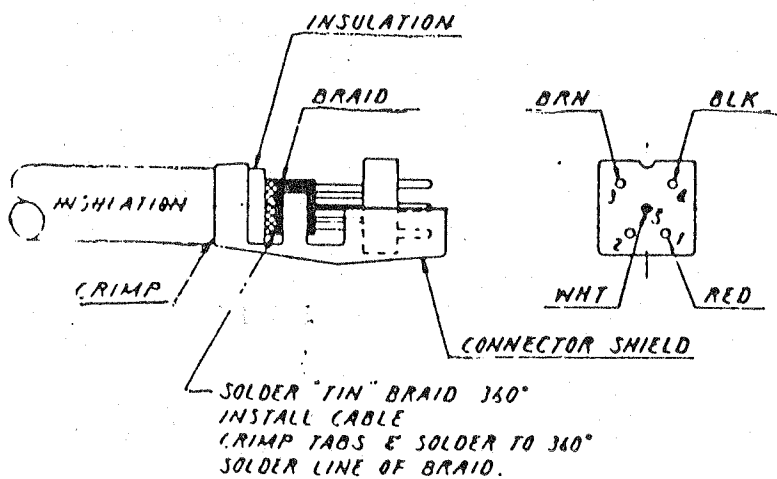
50,000 hours - minimum @ 35°C, nominal input, 75% load all outputs.

COMMODORE		TITLE	
		Power Supply, External - Consumer Amiga	
SIZE	DRAWING NO.	REV	SHEET
	312503		
		SCALE	

TABLE 2 - NOTES

- A. Line Regulation - is defined as the maximum allowable deviation of an output voltage above or below its specified nominal value when the AC input is taken above or below its nominal value to the rated maximum or minimum level.
- B. Load Regulation - is defined as the maximum allowable deviation of an output voltage above or below its specified nominal value when the load is taken above or below its nominal value to the rated maximum or minimum level.
- C. Cross Regulation - is defined as the effect seen in any auxiliary output when a change is made in the main +5 VDC output. The auxiliary output being measured is loaded to 20% of its maximum capacity and the main output is loaded to 60% of its maximum with a change of $\pm 30\%$. The effect of one auxiliary output on another is measured in the same way; that is, the measured output is 20% loaded and the effecting output is loaded $60\% \pm 30\%$.
- D. Ripple and Noise - is measured at maximum rated load and is the peak to peak combination of ripple and noise. The measurement is made at the output connection.

FIGURE 2 - POWER SUPPLY CONNECTOR



<u>Wire List</u>			
<u>PIN</u>	<u>SIGNAL</u>	<u>COLOR</u>	<u>GAUGE</u>
1	+5VDC	RED	18
2	SHIELDED GND		
3	+12VDC	BRN	22
4	SIGNAL GND	BLK	18
5	-12VDC	WHT	22

COMMODORE

TITLE

Power Supply, External -
Consumer Amiga

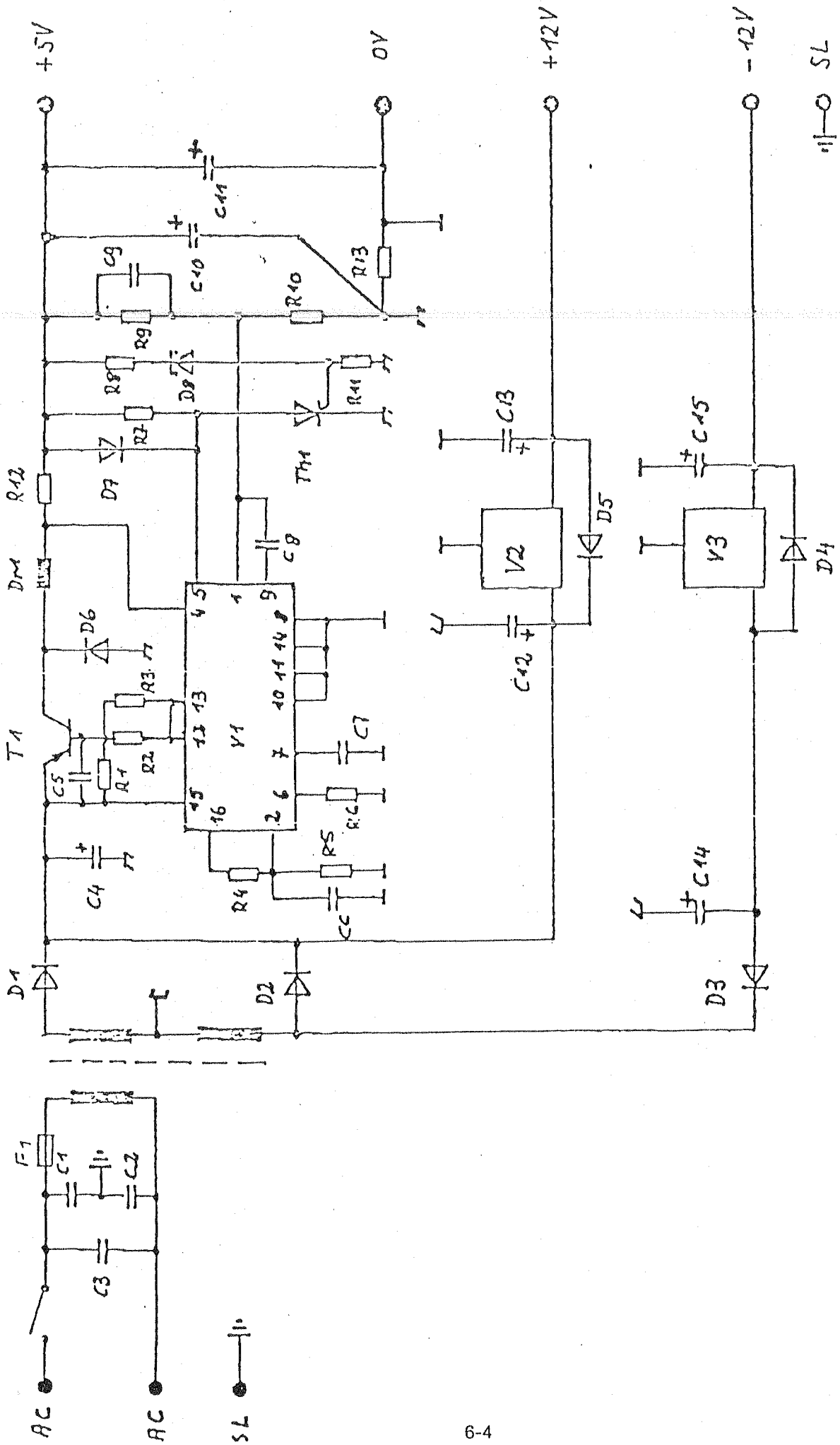
SIZE DRAWING NO.

312503

REV

SCALE

SHEET



BV 870219.03
Amiga 500

Elektrische Bauelemente A 500

R1	47	
R2	180	1/2 Watt
R3	180	1/2 Watt
R4	4k7	1%
R5	1k5	1%
R6	12k	1%
R7	47	
R8	47	
R9	4k7	1%
R10	1k5	1%
R11	47	
R12		16 mm aktive Länge Manganindraht 0,5 0
R13		11 mm aktive Länge Manganindraht 0,5
C1	2n5	250V Y
C2	2n5	250V Y
C3	0.1 u	250V X
C4	4700 u	/25V
C5	2n2	10%
C6	0.1 u	
C7	2n2	10%
C8	15n	10%
C9	0.1 u	
C10	4700 u	/6V
C11	22u	/16V
C12	220u	/25V
C13	22u	/16V
C14	220u	/25V
C15	22u	/16V
D1	1N5401	
D2	1N5401	
D3	1N4001	
D4	1N4148	
D5	1N4148	
D6	SB530	o. ähnlich
D7	1N4001	
D8	ZPD5V6	

T1	D45H2
Th	TL106 o. ähnlich
V1	SG3524 B, UC3524A
V2	7812
V3	7912
Dr	40uH/5A
F1	T315mA 5x20 (für 220V-Version BV 870219.03) T600mA 5x20 (für 117V-Version BV 870219.01)

GERMAN KEYBOARD (d)

