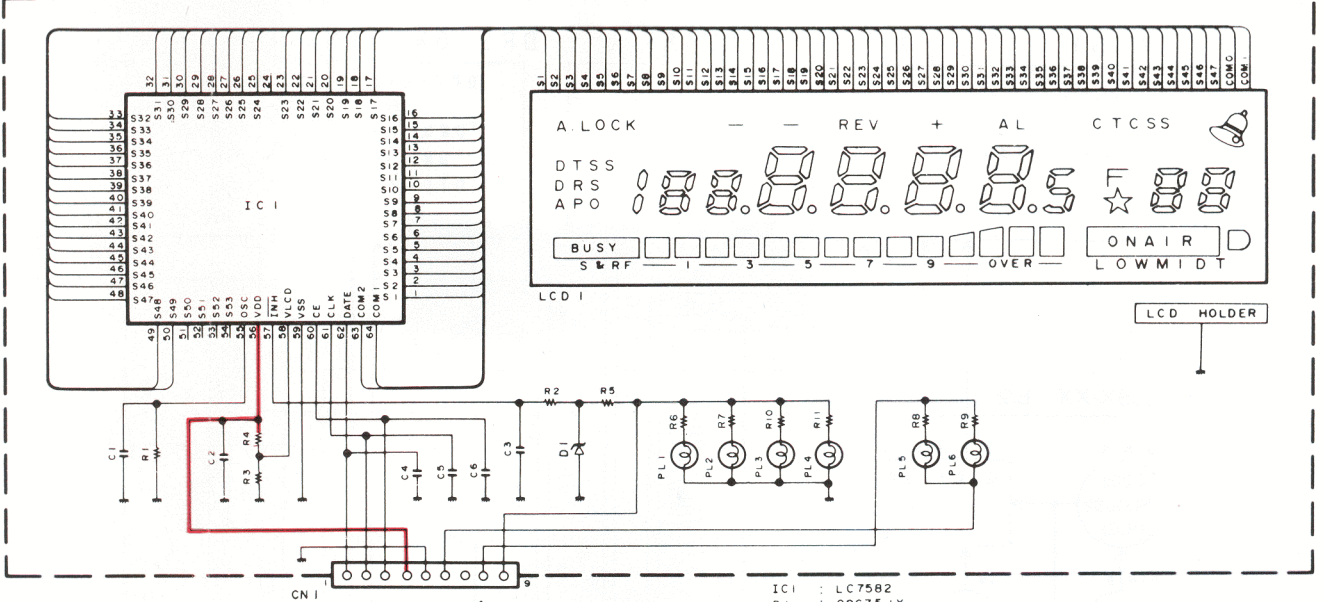


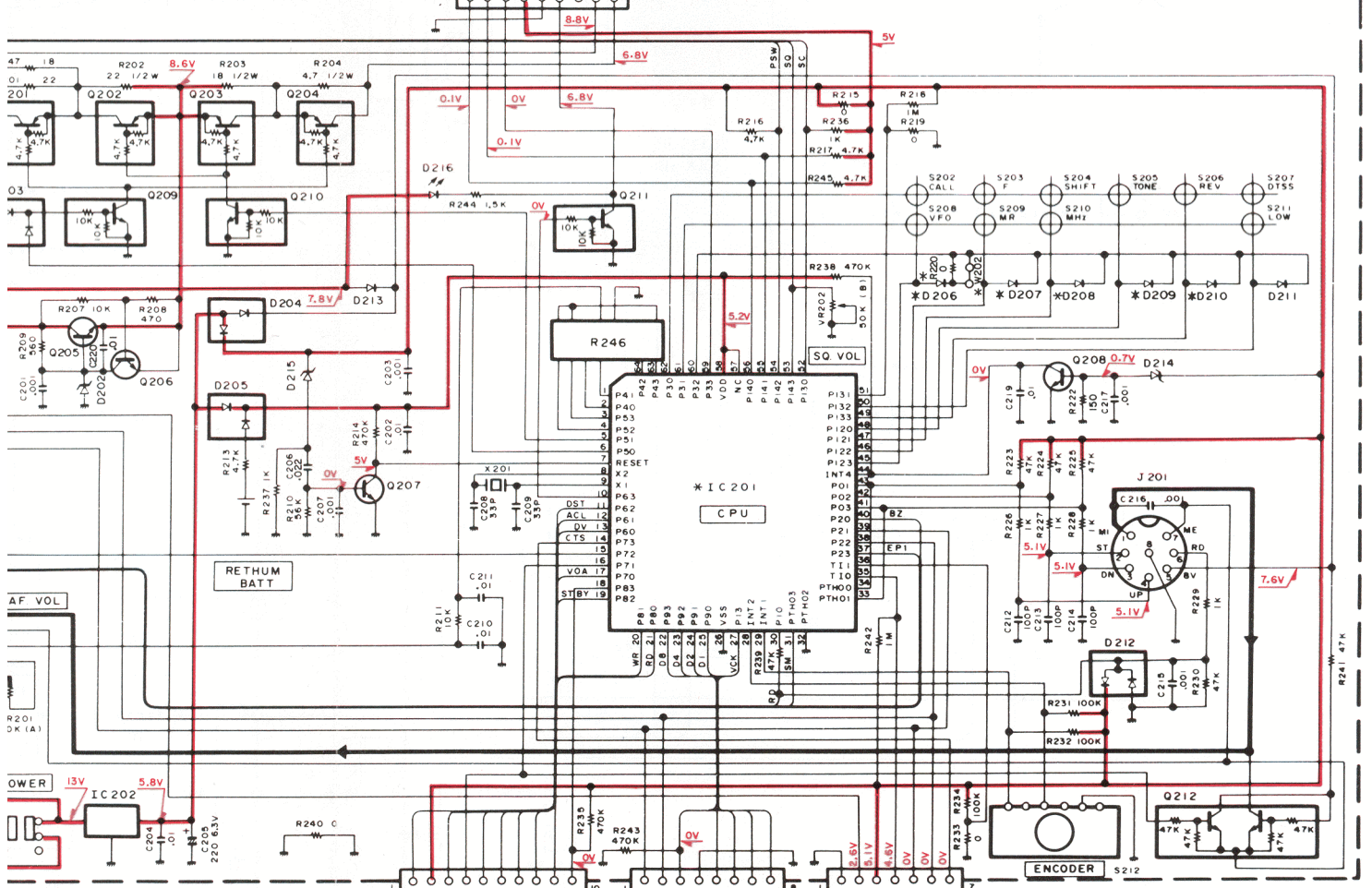
SCHEMATIC DIAGRAM TM-2

(B38-0330-05) LCD ASS'Y



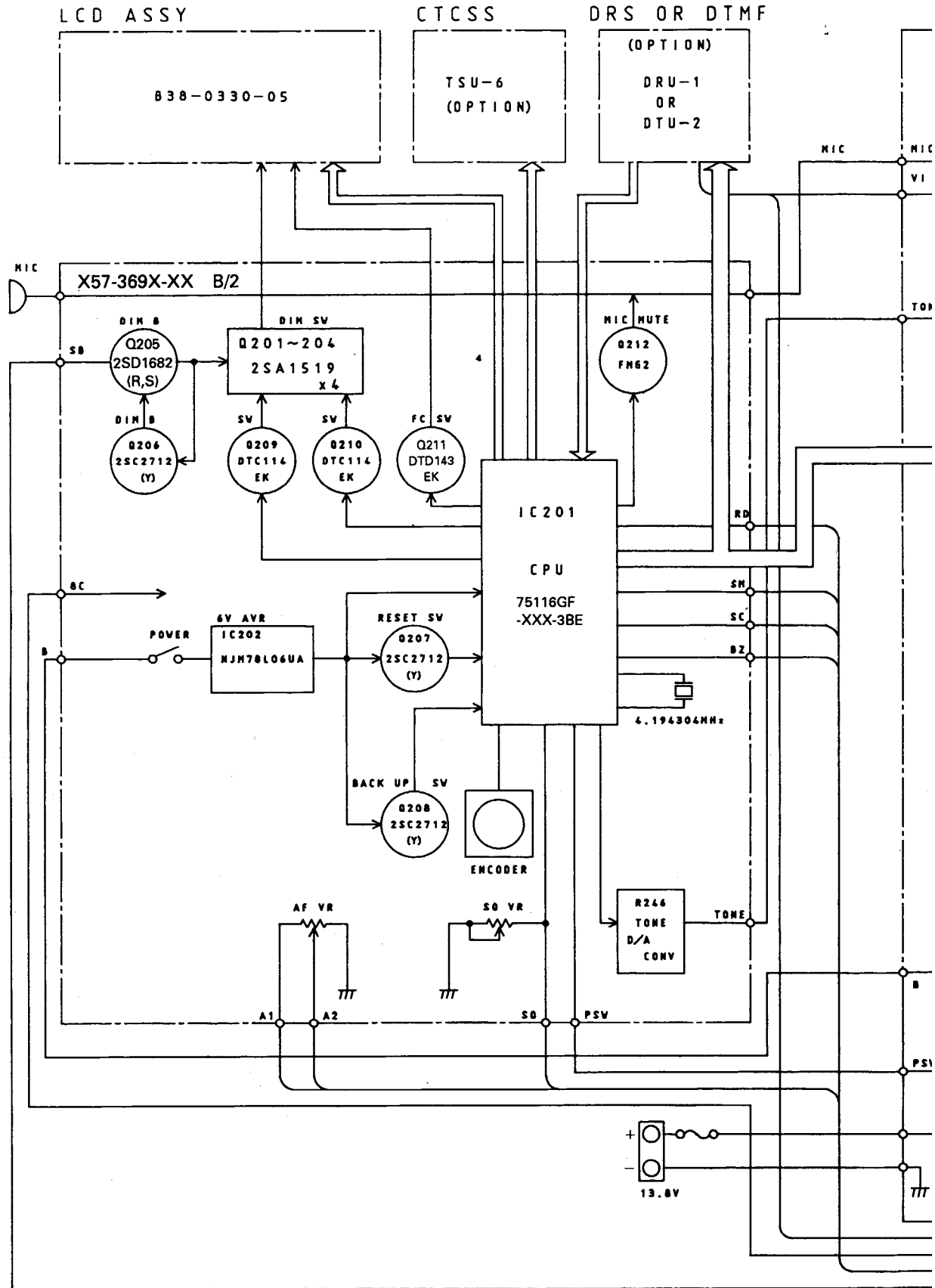
IC1 : LC7582
DI : 02C25.1Y

(B/2)

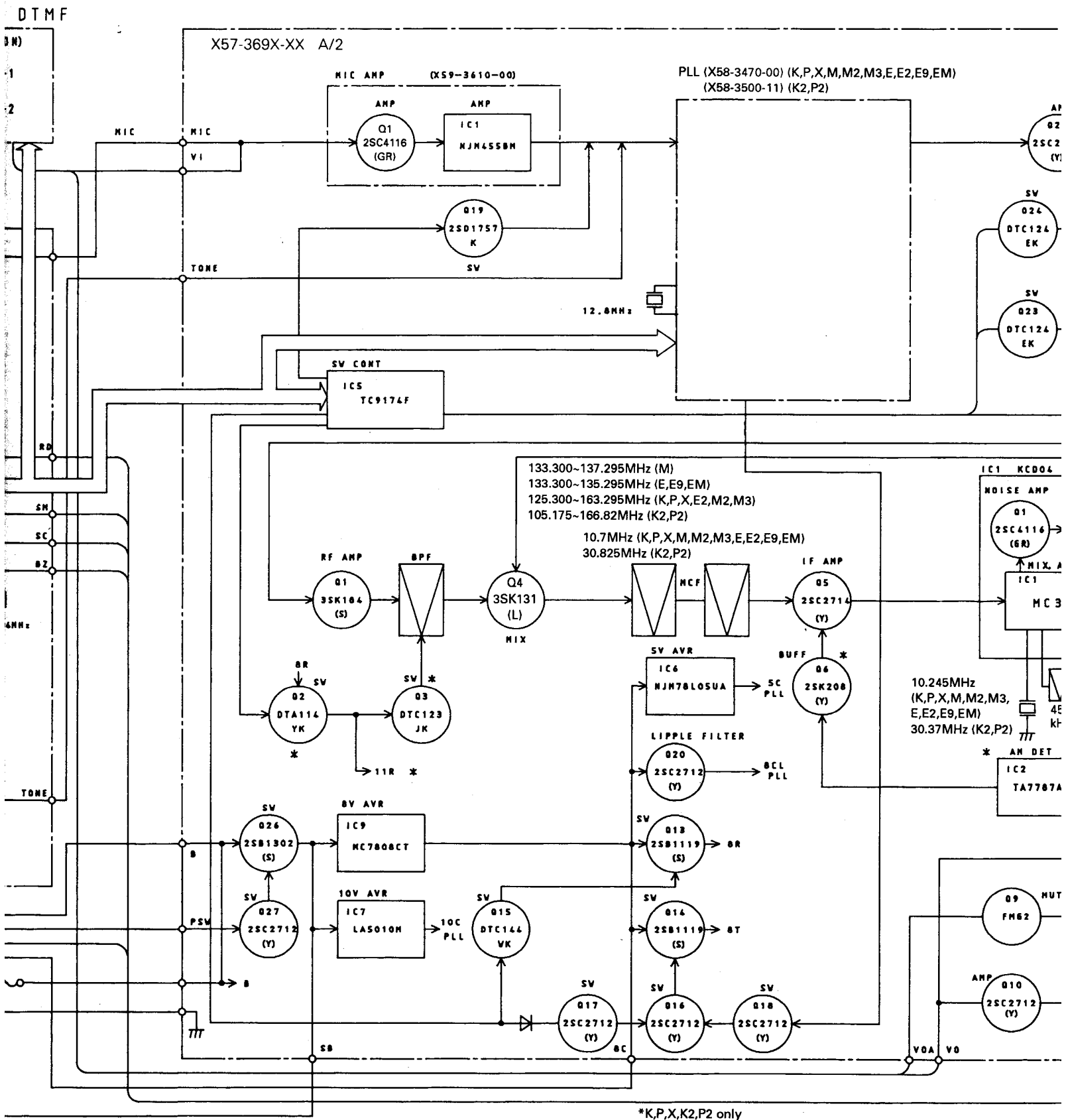


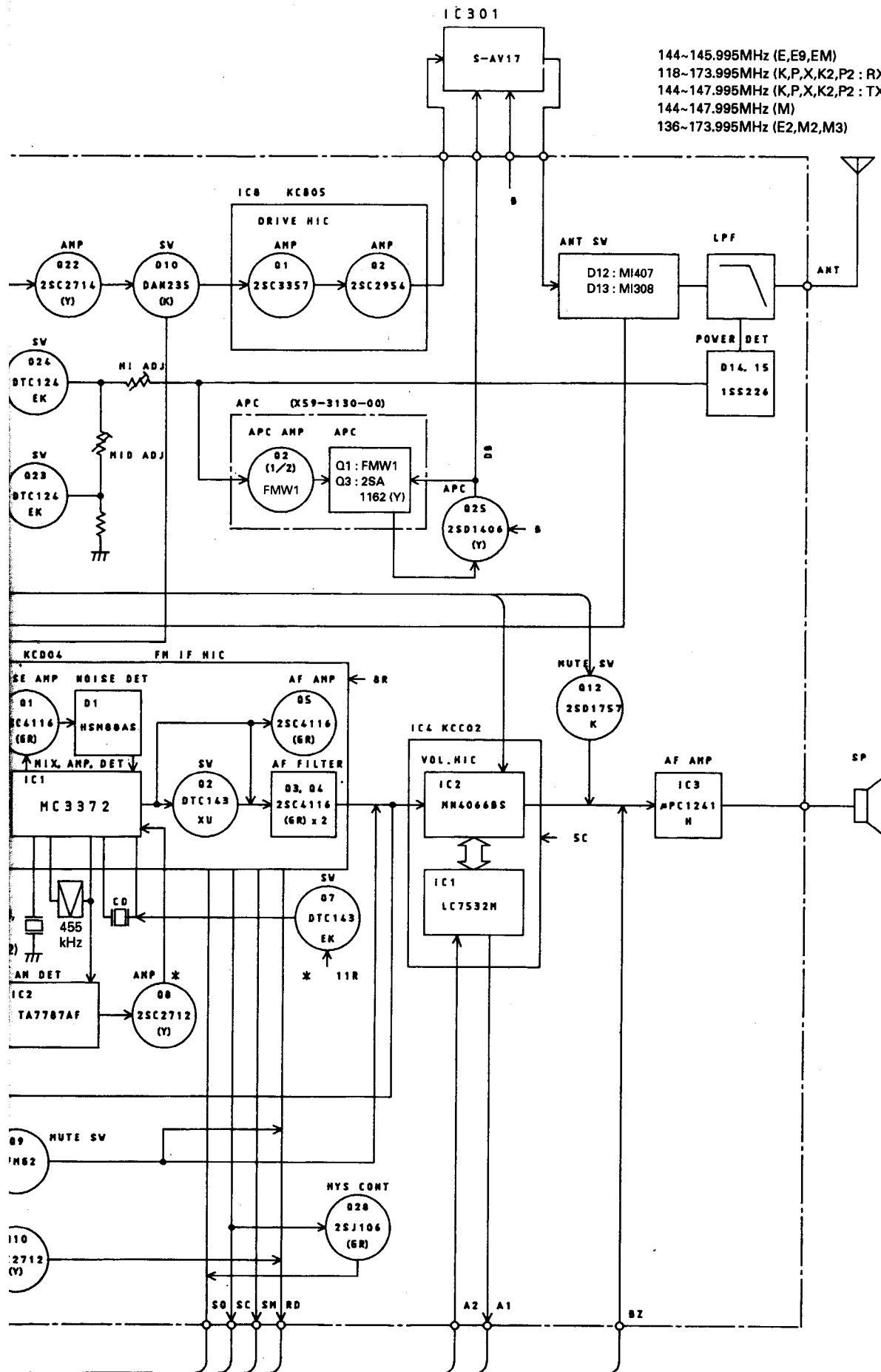
Q201-204: 2SA1519
Q205 : 2SD1682 (R,S)
Q206-208: 2SC2712 (Y)
Q209,210 : DTC114EK
Q211 : DTD143EK
Q212 : FMG2

D202 : 02Z9.1 (Y)
D203,205-208,217 : 1SS184
D204 : 1SS181
D209-211 : MA141A
D212 : 1SS226
D213 : LFB01
D214 : 02C23.9 (Z)
D215 : 02C23.0 (Z)
D216 : B30-0852-05



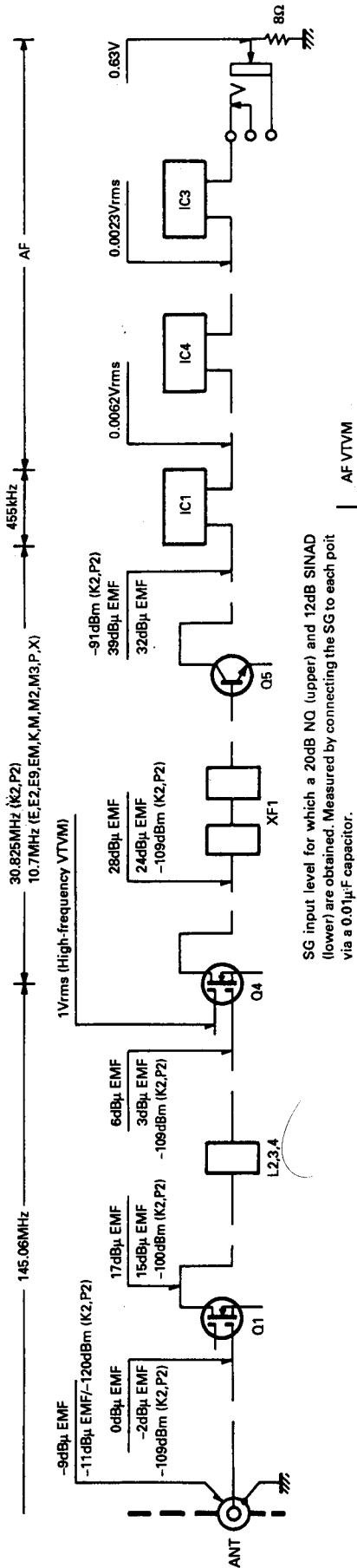
BLOCK DIAGRAM





LEVEL DIAGRAM

Receiver section

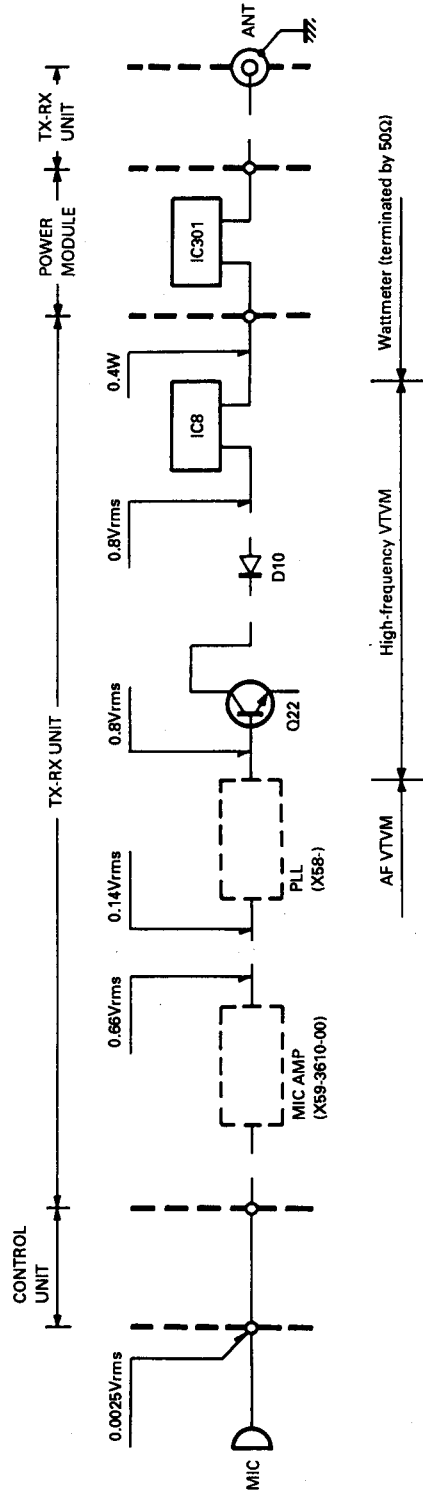


SG input level for which a 20dB NQ (upper) and 12dB SINAD (lower) are obtained. Measured by connecting the SG to each port via a 0.01μF capacitor.

AF VTVM

AF level obtained when the AF output level is adjusted for 0.63V/8Ω with the front panel AF VOL control. Measured with AF voltmeter connected to the external speaker jack, receiving a 40dB EMF SSG signal modulated at 1kHz, DEV 3kHz.

Transmitter section



CONTROL UNIT

TX-RX UNIT

POWER MODULE

TX-RX UNIT

High-frequency VTVM

AF VTVM

Wattmeter (terminated by 50Ω)

1. AG is set so that MIC input becomes 3kHz DEV at 1kHz MOD.
2. Transmitting frequency : 145.06MHz.

DRU-1 (DIGITAL RECORDING UNIT)

DRU-1 CIRCUIT DESCRIPTION

1. Overview

The DRU-1 is a digital recording and playback unit designed to be installed inside the TM-241 A/E series. This unit has the following features:

- Recording received audio (for output to the internal speaker) or transmit audio (microphone input)
- Outputting recorded audio to the internal speaker or outputting recorded audio as modulating signals during transmission
- Built-in lithium battery back-up for maintaining DRU-1 contents
- DTSS and paging code reception.

2. Operations

• Recording received audio (for output to the internal speaker)

A received signal from the VO pin is fed into pin 1 (0Y) of the multiplexer IC1 (TC4052BF). It is then fed into pin 59 (MIC IN) of IC3 (TC8830AF) via pin 3 (Y). The signal is amplified approx. 26dB by a mic amplifier in IC3, and output via pin 60 (C1). The signal from pin 60 is fed into pin 63 (C2) and amplified approx. 20dB. The amplified signal is applied to pin 64 (MIC OUT) and pin 65 (ADI).

• Recording transmit audio (microphone input)

Microphone input from the VI pin is amplified by Q5, and fed into pin 2 (2Y) of the multiplexer IC1 (TC4052BF). It is then supplied to IC3 (TC8830AF) via pin 3 (Y) and recorded in the same way as in recording received sound.

DRU-1 DESCRIPTION OF COMPONENTS

ACCESSORY UNIT (X42-3010-00)

Component	Use/Function	Description
IC1	Multiplexer	See DRU-1 circuit description.
IC2	DTMF decode	
IC3	Audio recording and playback	See DRU-1 semiconductor data.
IC4~7	S-RAM	
Q1	AF amplification	Receive DTMF input amplification.
Q2	AF amplification	DTMF (from MIC) input amplification.
Q3	AF amplification	BEEP.
Q4	Switch	BEEP AMP.
Q5	AF amplification	Mic input amplification.
Q6	AF amplification	Playback sound amplification.
Q7	Switch	ACL line.
D1	Reverse current prevention	
D2	Reverse current prevention	Back-up.

• Outputting recorded audio to the internal speaker

D/A convertor output from pin 66 (DAO) of IC3 (TC8830AF) is passed through a CR filter, and amplified by Q6. The amplified signal is then fed into pin 13 (X) of the multiplexer IC1 (TC4052BF), and output to the VO pin via pin 14 (1X).

• Outputting recorded audio as modulating signals during transmission

When sound recorded in the DRU-1 is played during transmission, the same operations as written above in outputting recorded audio to the internal speaker occur. That is, D/A convertor output from pin 66 (DAO) of IC3 (TC8830AF) is passed through a CR filter, amplified by Q6, and fed into pin 13 (X) of the multiplexer IC1 (TC4052BF). The sound, however, is output via pin 11 (3X).

	VOA (pin 10)	VOB (pin 9)	On channel
Output to speaker	H	L	1X (pin 14)
Output during transmission	H	H	3X (pin 11)
Received audio recording	L	L	0Y (pin 1)
Transmit aidop recording	L	H	2Y (pin 2)

Table 1 IC1 : TC4052BF operations

• DTSS and paging code reception

The DTMF signal input from the VO pin is amplified by Q1 and input to pin 12 of DTMF decoder IC2 (LR4102N). When the DTMF signal is input to IC2, pin 20 (DV pin) is made high. A DTMF code is then output to pins 1 (D1), 24 (D2), 23 (D4), and 22 (D8) of IC2. The CPU can receive the DTMF signal by detecting the DTMF signal input from the DV pin and reading D1, D2, D4, and D8 data.

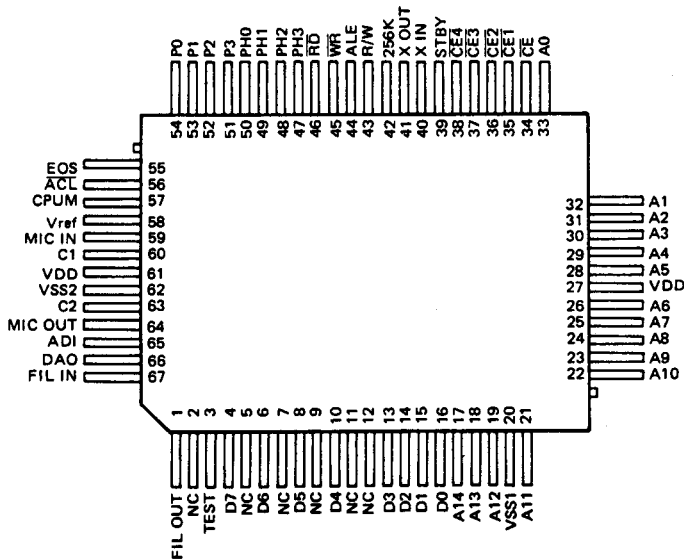
TM-241A/E

DRU-1 (DIGITAL RECORDING UNIT)

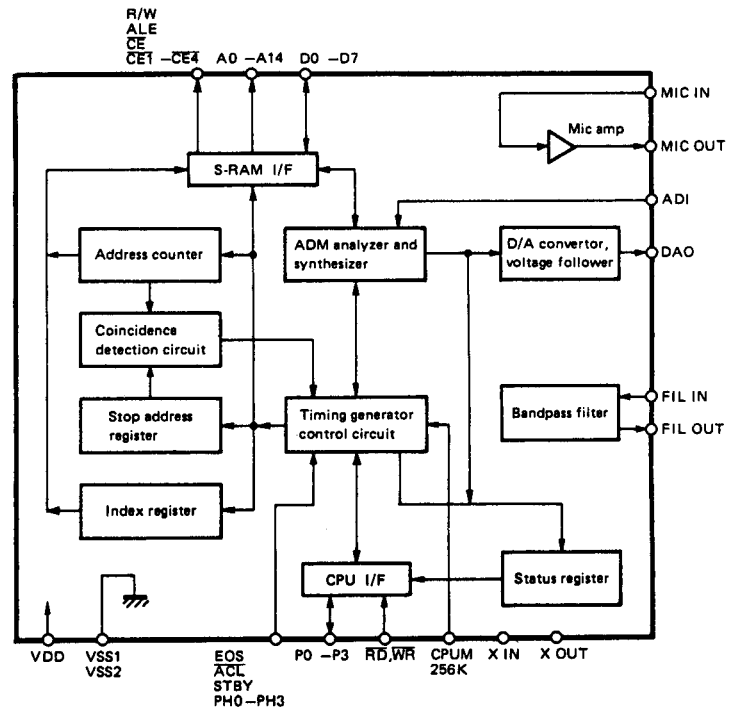
DRU-1 SEMICONDUCTOR DATA

1. Audio recording and playback : TC8830AF (IC3)

• Terminal connection diagram



• Block diagram



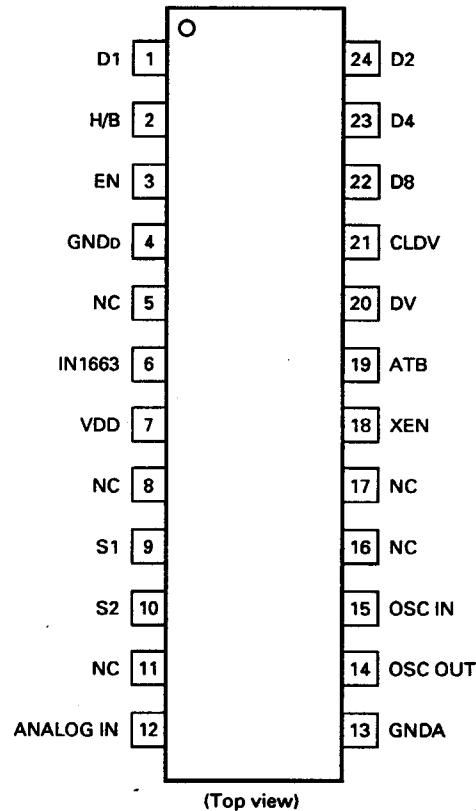
• Terminal functions

Pin No.	Pin name	I/O	Function	Pin No.	Pin name	I/O	Function
1	FIL OUT	O	Not used.	41	X OUT	O	512kHz oscillation circuit.
2	NC	-	Not connected.	42	256K	I	64K/256K RAM select, "H" when 256K used.
3	TEST	-	Not used.	43	R/W	O	RAM read/write output.
4	D7	I/O	RAM data I/O.	44	ALE	-	Not used.
5	NC	-	Not connected.	45	WR	I	Write pulse input.
6	D6	I/O	RAM data I/O.	46	RD	I	Read pulse input.
7	NC	-	Not connected.	47~50	PH3~PH0	-	Not used.
8	D5	I/O	RAM data I/O.	51~54	P3~P0	I/O	Data bus.
9	NC	-	Not connected.	55	EOS	-	Not used.
10	D4	I/O	RAM data I/O.	56	ACL	I	Reset signal input.
11,12	NC	-	Not connected.	57	CPUM	I	"H" when CPU control enabled.
13~16	D3~D0	I/O	RAM data I/O.	58	Vref	O	Analog circuit reference voltage output.
17~19	A14~A12	O	RAM address output.	59	MIC IN	I	Mic amp. 1 input.
20	Vss1	-	GND.	60	C1	O	Mic amp. 1 output.
21~26	A11~A6	O	RAM address output.	61	VDD	-	Power supply.
27	VDD	-	Power supply.	62	VSS2	-	GND.
28~33	A5~A0	O	RAM address output.	63	C2	I	Mic amp. 2 input.
34	CE	-	Not used.	64	MIC OUT	O	Mic amp. 2 output.
35~38	CE1~CE4	O	RAM chip enable.	65	ADI	I	Audio analysis circuit input.
39	STBY	I	Minimum current standby when standby input is "H".	66	DAO	O	D/A convertor output.
40	X IN	I	512kHz oscillation circuit.	67	FIL IN	I	Not used.

DRU-1 (DIGITAL RECORDING UNIT)

2. DTMF decoder : LR4102N (IC2)

• Terminal connection diagram



• Terminal functions

Pin No.	Name	I/O	Function
1	D1	O	DTMF data output.
2	H/B	I	16 digit cord setting.
3	EN	I	Output enable.
4	GND _d	-	Digital GND (GND).
5	NC	-	NC
6	IN1633	I	Valid 1633Hz (GND).
7	V _{DD}	-	Power supply.
8	NC	-	NC
9	S1	-	Bypass (Connected to ground by a 0.01μF capacitor).
10	S2	-	Bypass (Connected to ground by a 0.01μF capacitor).
11	NC	-	NC

Pin No.	Name	I/O	Function
12	ANALOG IN	I	DTMF signal input.
13	GNDA	-	Analog GND.
14	OSC OUT	O	X-tal output.
15	OSC IN	I	X-tal input.
16	NC	-	NC
17	NC	-	NC
18	XEN	I	X-tal enable.
19	ATB	O	NC
20	DV	O	Data varied.
21	CLDV	I	Data varied clear.
22	D8	O	DTMF data output.
23	D4	O	DTMF data output.
24	D2	O	DTMF data output.

TM-241A/E

DRU-1 (DIGITAL RECORDING UNIT)

DRU-1 PARTS LIST

× New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.

Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
DRU-1						
-			B42-3317-04 B50-8290-00	LABEL INSTRUCTION MANUAL		
			G10-0666-04 G10-0679-04 G13-0913-04	NON-WOVEN FABRIC NON-WOVEN FABRIC FORMED PLATE		
-			H01-8249-03 H03-2772-04 H21-0704-04 H25-0029-04 H25-0710-04	ITEM CARTON BOX OUTER PACKING CASE PROTECTION SHEET PROTECTION BAG PROTECTION BAG		
			N87-2606-46 X42-3010-00	BRAZIER HEAD TAPTITE SCREW ACCESSORY UNIT		
ACCESSORY UNIT (X42-3010-00)						
C1			CK73FB1H103K	CHIP C 0.010UF K		
C2			CK73FB1H102K	CHIP C 1000PF K		
C3			CK73FF1E154Z	CHIP C 0.15UF Z		
C4 -6			CK73FB1H103K	CHIP C 0.010UF K		
C7			CK73EF1C10SZ	CHIP C 1.0UF Z		
C8 -10			CK73FB1H103K	CHIP C 0.010UF K		
C11			CK73FF1E104Z	CHIP C 0.10UF Z		
C12			CK73FB1H103K	CHIP C 0.010UF K		
C14			CK73FB1H102K	CHIP C 1000PF K		
C15			CK73FF1E104Z	CHIP C 0.10UF Z		
C13			CK73FB1H222K	CHIP C 2200PF K		
C16			CK73FB1H103K	CHIP C 0.010UF K		
C17			CK73FF1E104Z	CHIP C 0.10UF Z		
C19			CK73FB1H103K	CHIP C 0.010UF K		
C20			CK73FB1H102K	CHIP C 1000PF K		
C21 ,22			CC73FSL1H101J	CHIP C 100PF J		
C23			CK73FB1H103K	CHIP C 0.010UF K		
C24			C92-0010-05	CHIP TAN 6.8UF 6.3WV		
C25			CK73FF1E104Z	CHIP C 0.10UF Z		
C26			CK73FB1H333K	CHIP C 0.033UF K		
C27			CC73FSL1H101J	CHIP C 100PF J		
C28			CK73EB1H104K	CHIP C 0.10UF K		
C29			C92-0005-05	CHIP TAN 2.2UF 6.3WV		
CN1			E40-5207-05	PIN CONNECTOR		
CN2			E40-5206-05	PIN CONNECTOR		
CN3			E40-5181-05	PIN CONNECTOR		
W1			E31-6005-05	CONNECTING WIRE		
W2			E31-6006-05	CONNECTING WIRE		
W3			E31-6007-05	CONNECTING WIRE		
			F20-0520-04 F20-0521-04	INSULATING BOARD INSULATING BOARD		
X1			L77-1398-05	CRYSTAL RESONATOR 3.579545MHZ		
X2			L78-0050-05	RESONATOR 512KHZ		
R1			RK73FB2A103J	CHIP R 10K J 1/10W		
R2			RK73FB2A392J	CHIP R 3.9K J 1/10W		
R3			RK73FB2A103J	CHIP R 10K J 1/10W		
R4			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R5			RK73FB2A102J	CHIP R 1.0K J 1/10W		

E: Scandinavia & Europe K: USA P: Canada W: Europe

U: PX(Far East, Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

△ indicates safety critical components.

DRU-1 (DIGITAL RECORDING UNIT)

* New Parts

Parts without Parts No. are not supplied.

Les articles non mentionnés dans le Parts No. ne sont pas fournis.


Teile ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名 / 規格	Desti- nation 仕向	Re- marks 備考
R6			R92-0670-05	CHIP R 0 8HM		
R7			RK73FB2A223J	CHIP R 22K J 1/10W		
R8			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R9			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R10			R92-0670-05	CHIP R 0 8HM		
R11			RK73FB2A223J	CHIP R 22K J 1/10W		
R12,13			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R14			RK73FB2A472J	CHIP R 4.7K J 1/10W		
R15			RK73FB2A104J	CHIP R 100K J 1/10W		
R16			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R17			RK73FB2A103J	CHIP R 10K J 1/10W		
R18			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R19			RK73FB2A562J	CHIP R 5.6K J 1/10W		
R20			RK73FB2A104J	CHIP R 100K J 1/10W		
R21			RK73FB2A561J	CHIP R 560 J 1/10W		
R22			RK73FB2A102J	CHIP R 1.0K J 1/10W		
R23			RK73FB2A564J	CHIP R 560K J 1/10W		
R24			RK73FB2A823J	CHIP R 82K J 1/10W		
R25			RK73FB2A223J	CHIP R 22K J 1/10W		
R26			RK73FB2A105J	CHIP R 1.0M J 1/10W		
R27			RK73FB2A222J	CHIP R 2.2K J 1/10W		
R28			RK73FB2A224J	CHIP R 220K J 1/10W		
R29 -31			R92-0670-05	CHIP R 0 8HM		
R32			RK73FB2A220J	CHIP R 22 J 1/10W		
R33			RK73FB2A394J	CHIP R 390K J 1/10W		
D1 ,2			1SS184	DIODE		
IC1			TC4052BF	IC(4CH MPX/DE-MPX)		
IC2			LR4102N	IC		
IC3			TC8830AF	IC		
IC4 -7			HM62256LFPI-12T	IC or HM62256LFP-12T		
Q1 -3			2SC2712(BL)	TRANSISTOR		
Q4			DTC144EK	DIGITAL TRANSISTOR		
Q5 ,6			2SC2712(BL)	TRANSISTOR		
Q7			DTC144WK	DIGITAL TRANSISTOR		
			W09-0326-05	LITHIUM BATTERY		

E: Scandinavia & Europe K: USA P: Canada W: Europe

U: PX(Far East, Hawaii) T: England M: Other Areas

UE: AAFES(Europe) X: Australia

 indicates safety critical components.