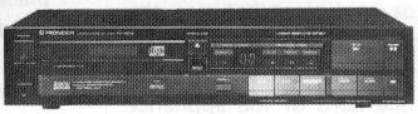
PIONEER

Service Manual

REPAIR & ADJUSTMENTS



ORDER NO.
ARP-922-0

COMPACT DISC PLAYER

PD-6010(BK)
PD-6010

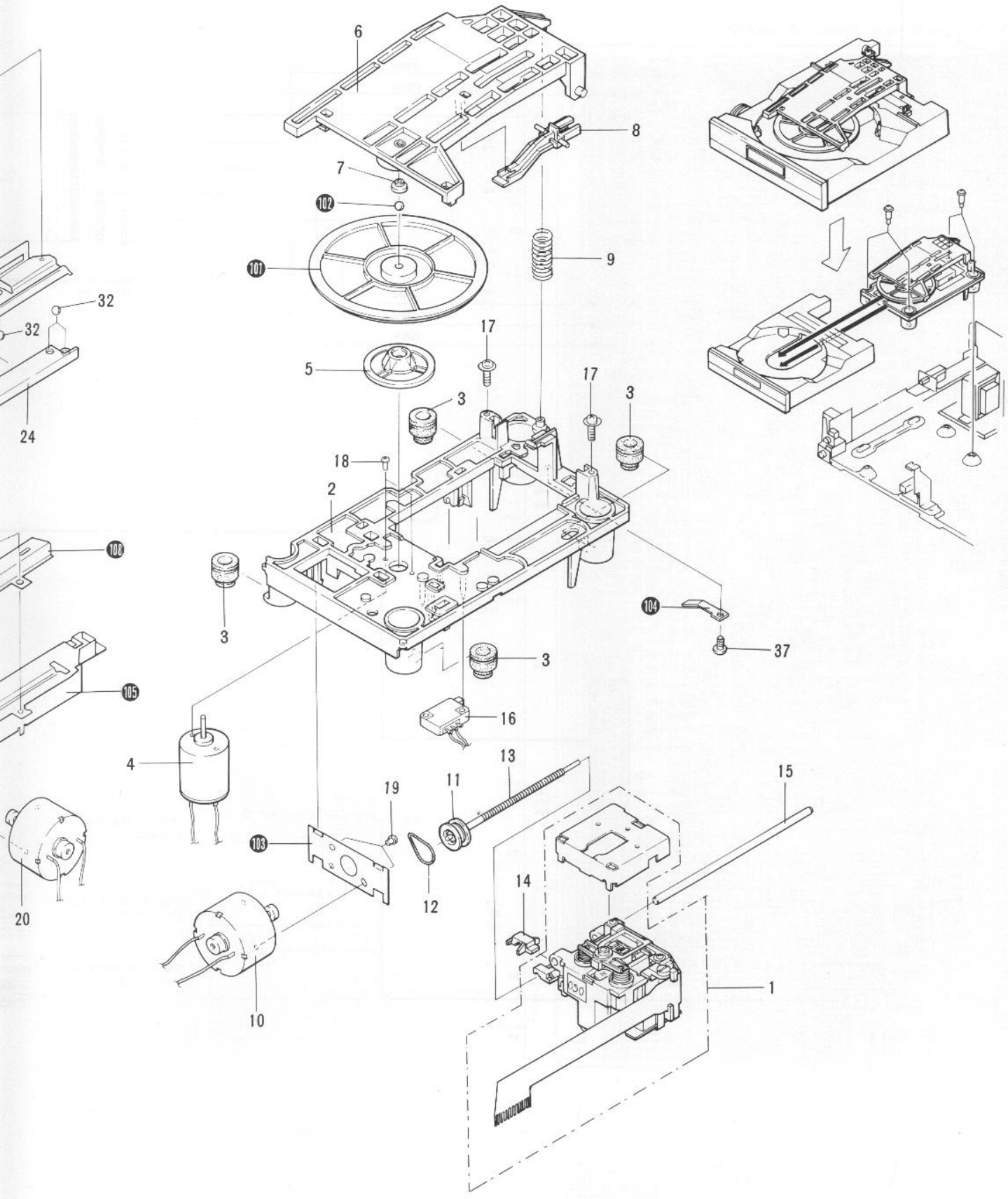
MODEL PD-6010 COMES IN FOUR VERSIONS DISTINGUISHED AS FOLLOWS.

Type	Applicable model		Power requirement	Destination
	PD-6010[BK]	PD-6010		
KU	○	–	AC120V only	U.S.A.
KC	○	–	AC120V only	Canada
HEM	○	○	AC220V	European continent
HB	○	○	AC240V	United Kingdom

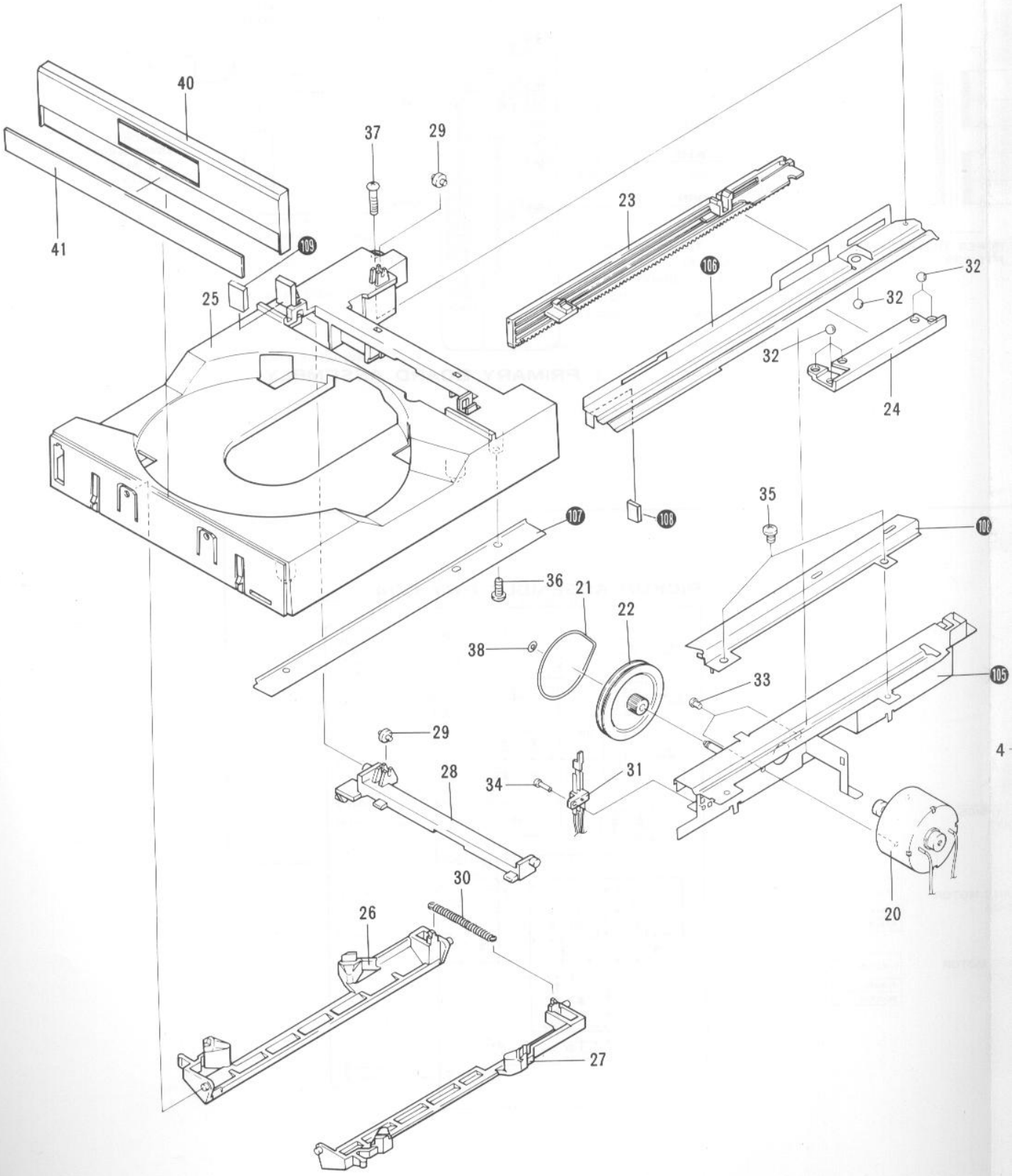
- **This service manual is applicable to the PD-6010/KU, KC, HEM and HB types.**
- **As to the KC, HEM and HB types please refer to pages 86 – 87.**
- **As to the circuit and mechanism descriptions, please refer to the PD-9010X service manual (ARP-883).**
- **Ce manual d'instruction se refére au mode de réglage, en français.**
- **Este manual de servicio trata del método de ajuste escrito en español.**

CONTENTS

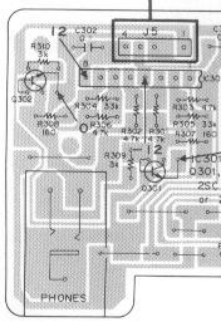
PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS [USA] INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
TEL: [800] 421-1404, [800] 237-0424
PIONEER ELECTRONIC [EUROPE] N.V. Keetberglaan 1, 2740 Beveren, Belgium TEL: 03/775·28·08
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia
TEL: [03] 580-9911


6
8
7
102
101
9
17
5
17
3
3
18
2
3
108
104
37
3
105
16
4
13
19
11
15
103
12
14
20
10
1

6.2 MECHANISM ASSEMBLY

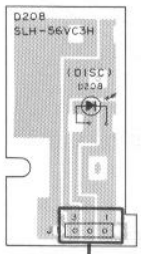


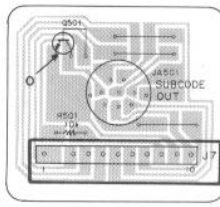
7. SCHEMATIC DIAGRAM AND P.C. BOARD PATTERNS



HEADPHONE BOA

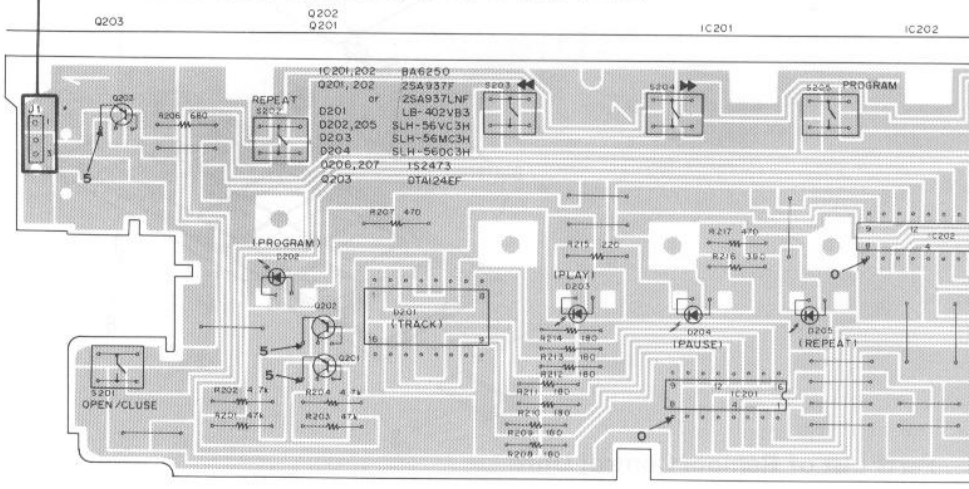
FUNCTION BOARD ASSEMBLY(2/2)
PWM-215





SUBCODE BOARD A

FUNCTION BOARD(1/2) PWM-215

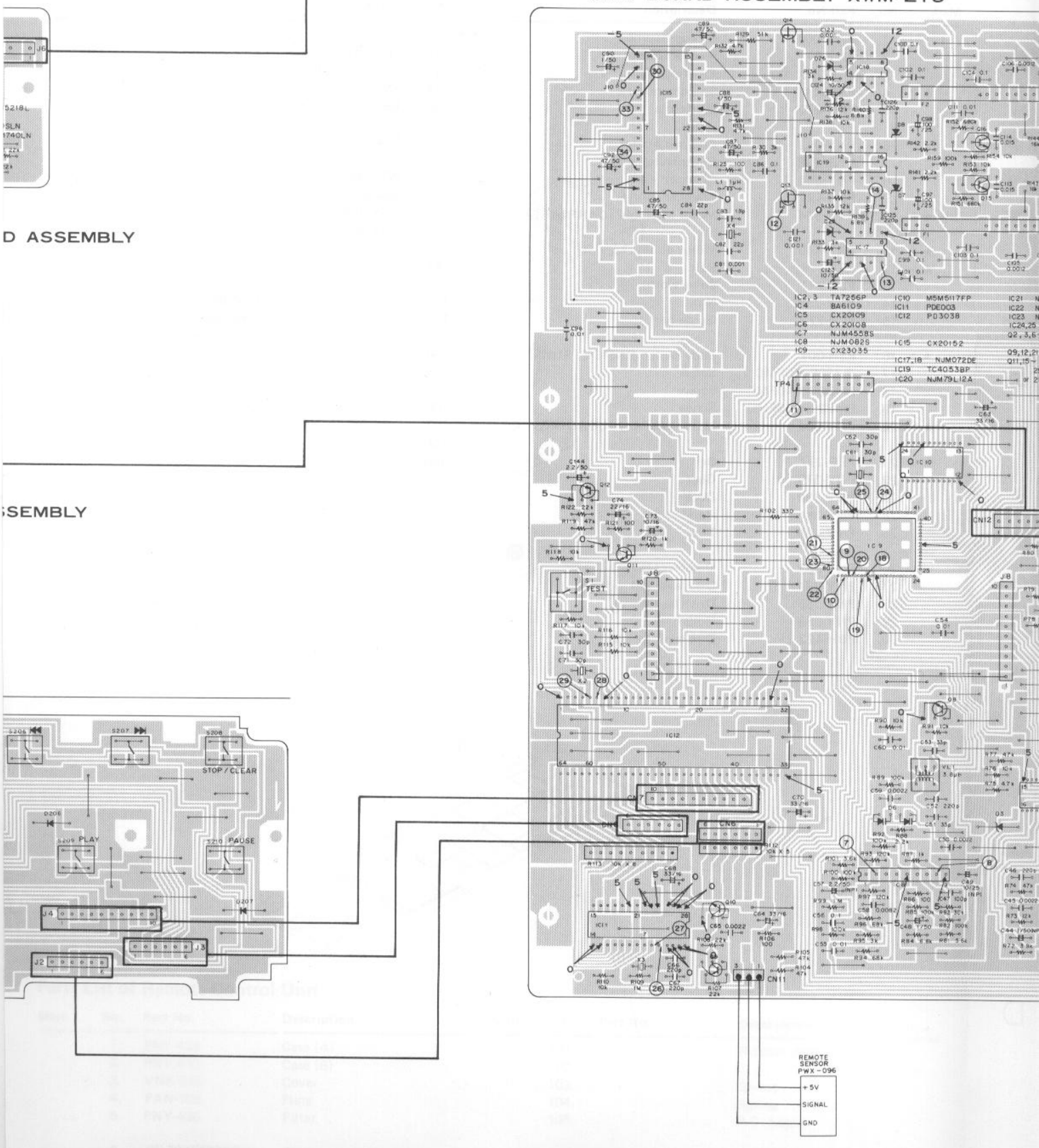


4 5 6

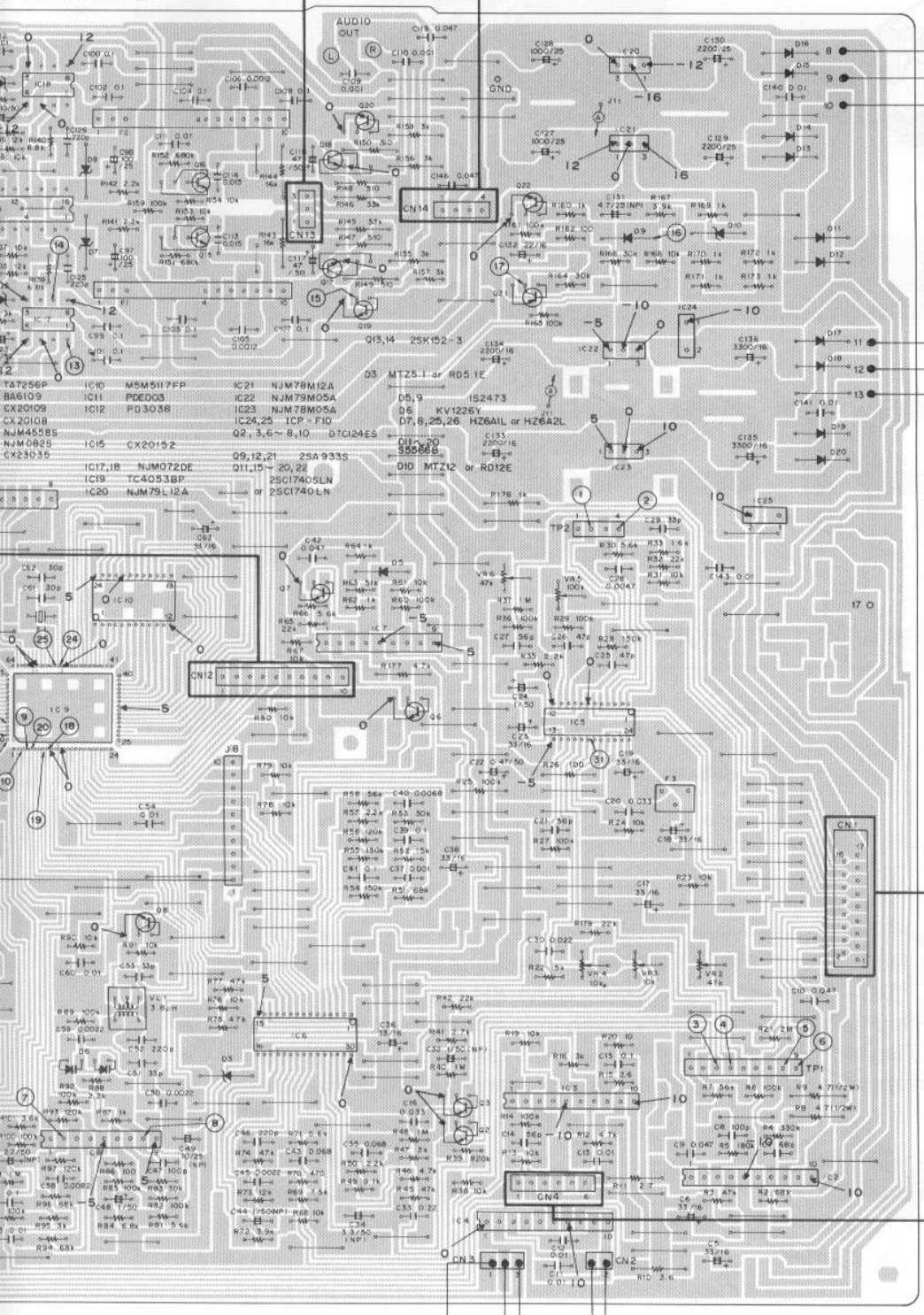
D ASSEMBLY

SSEMBLY

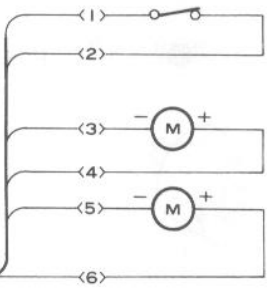
MAIN BOARD ASSEMBLY XWM-216

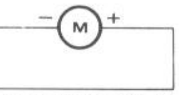


Y XWM-216



RED
RED
BLK
BRN
GRY
GRY



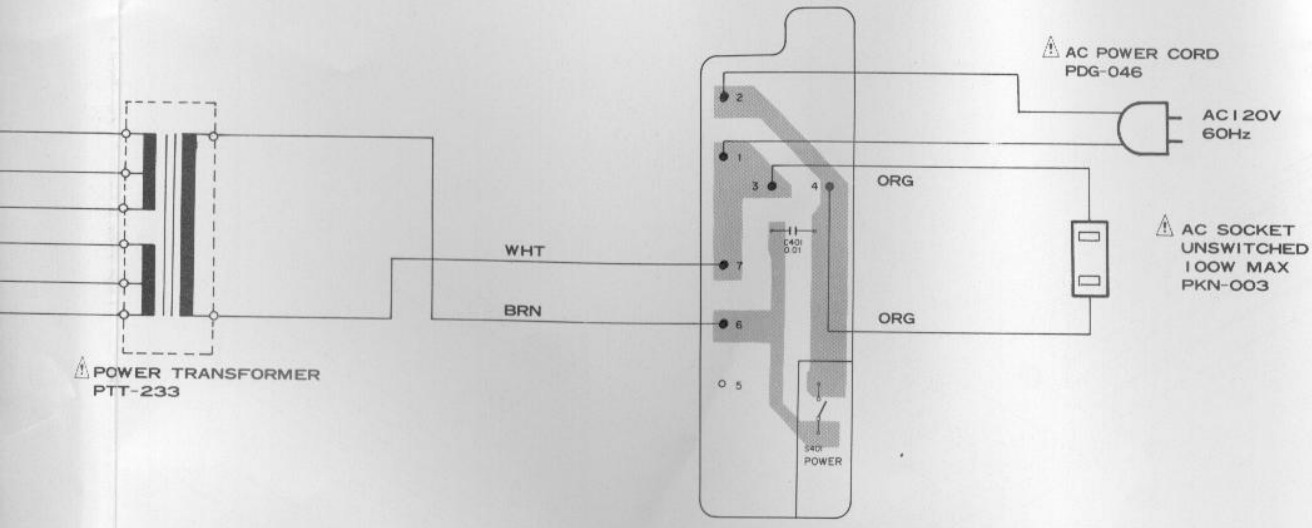


OPEN CLMP

S101 : PSN-003

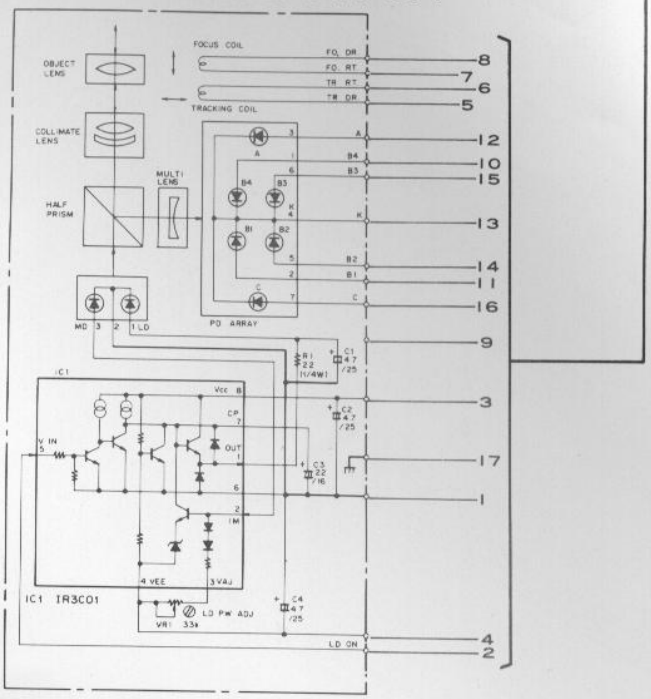
LOADING MOTOR
PYY-504

DIRECTION	CN2	
	1	2
LOADING IN	−	+
LOADING OUT	+	−



⚠ PRIMARY BOARD ASSEMBLY

PICKUP ASSEMBLY PWY-004



S101 : INSIDE
PSH-007

CARRIAGE MOTOR
PYY-504

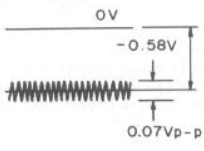
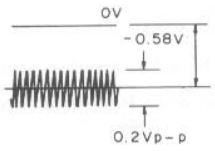
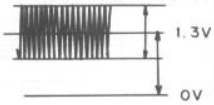
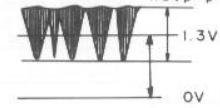
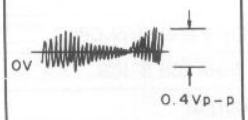
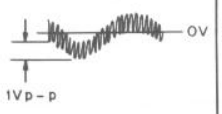
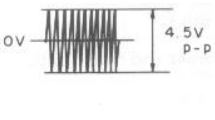
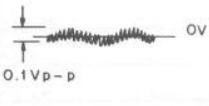
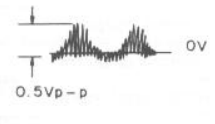
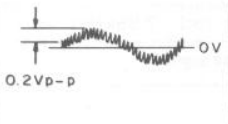
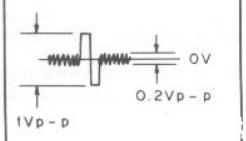
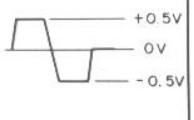
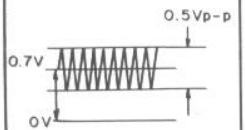
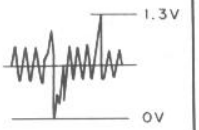
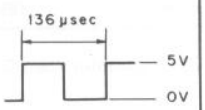
DIRECTION	CN4	
	3	4
FOWARD	−	+
REVERSE	+	−

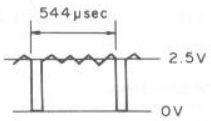
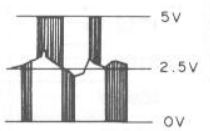
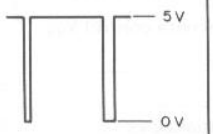
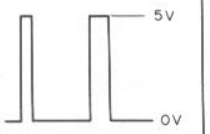
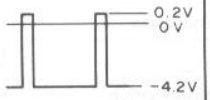
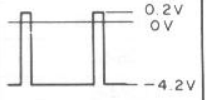
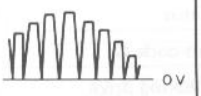
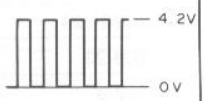
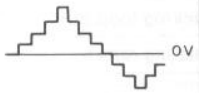
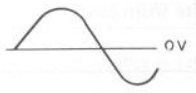
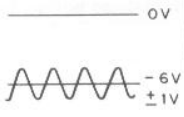
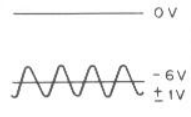
SPINDLE MOTOR
PXM-147

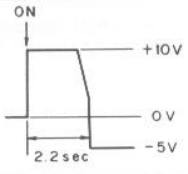
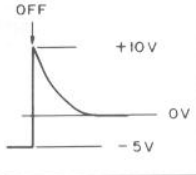
DIRECTION	CN4	
	5	6
FOWARD	−	+
REVERSE	+	−

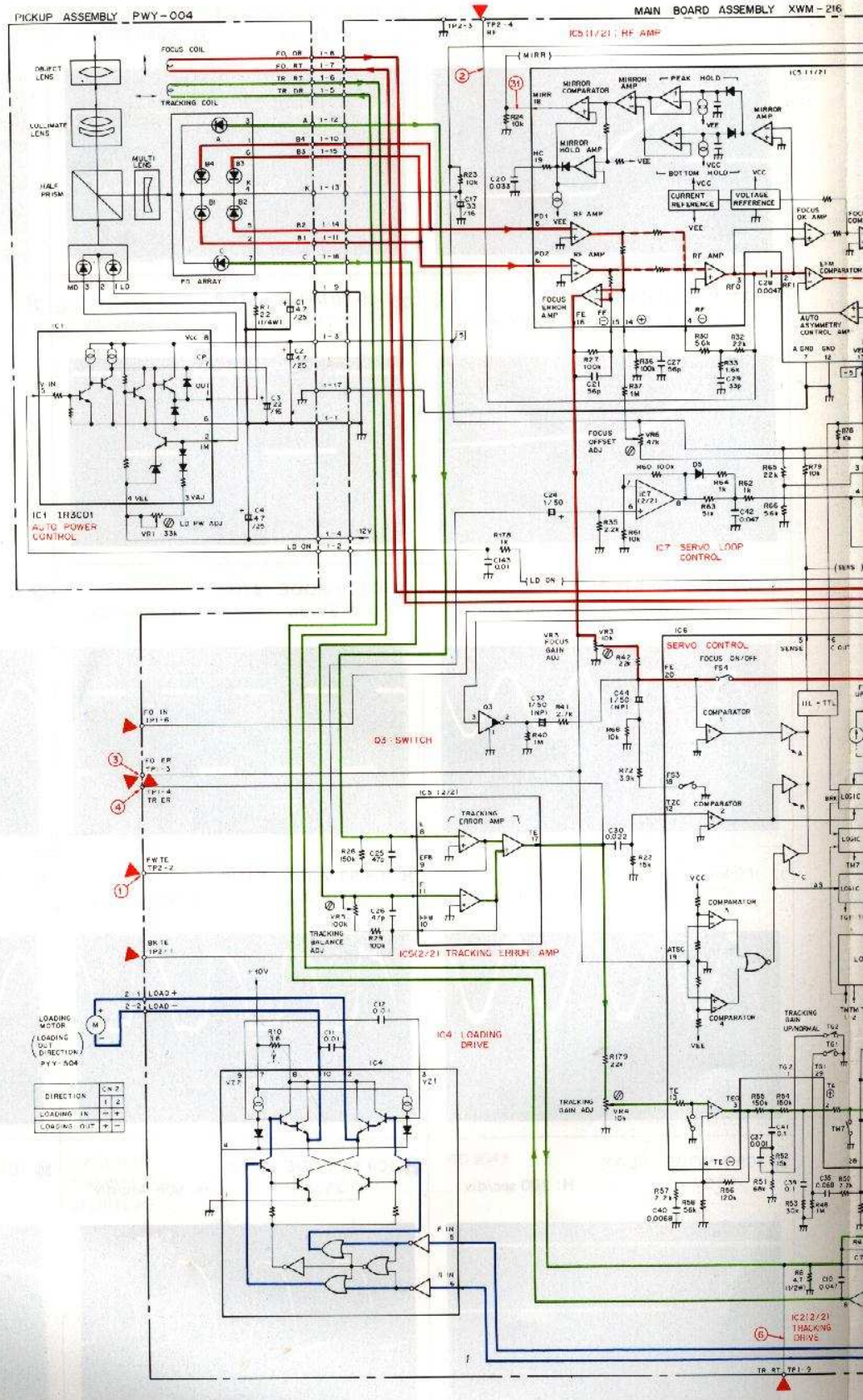
• WAVE FORM

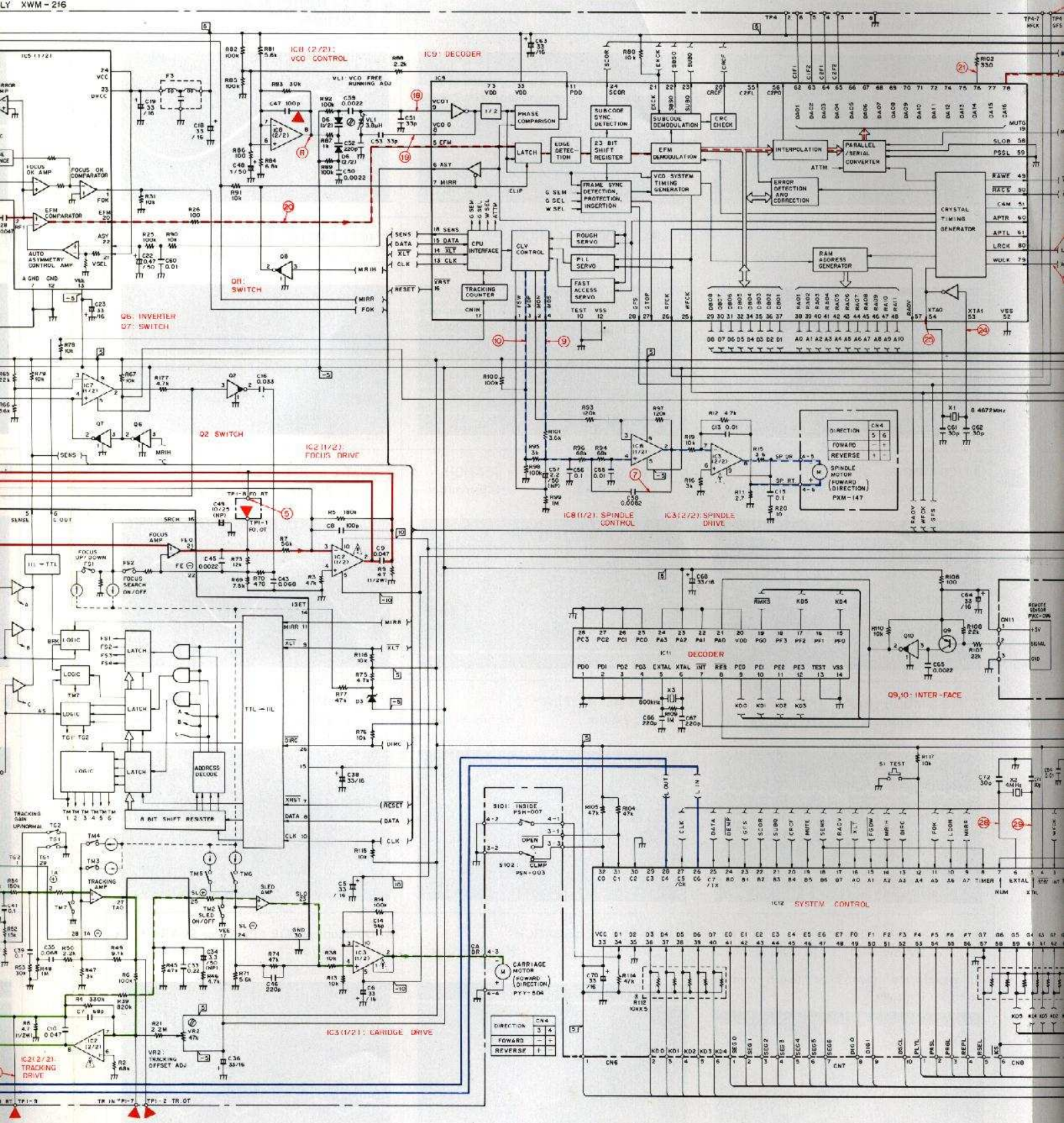
Note: The waveform voltage and time values are general guides only.

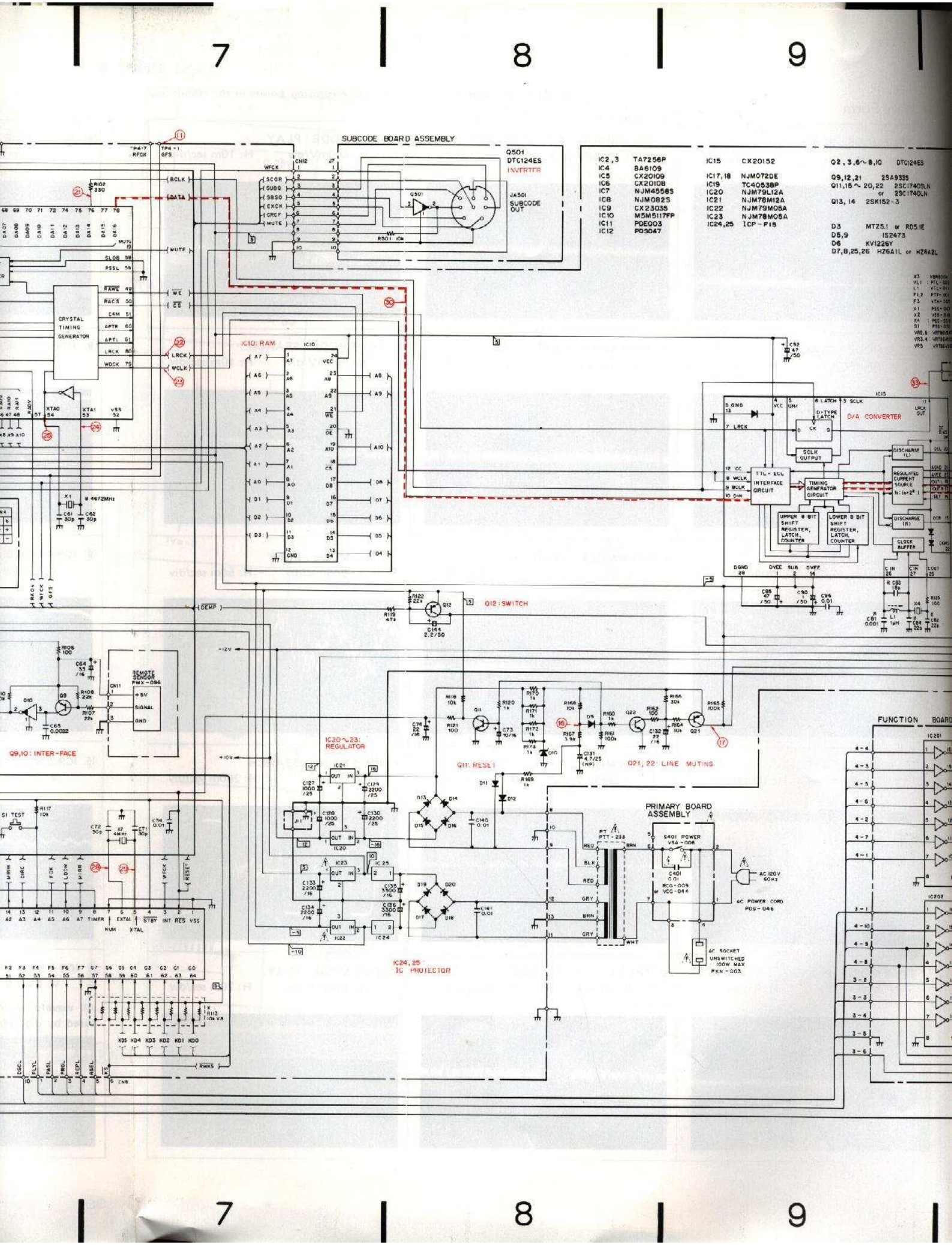
	PLAY	SEARCH
①		
②		
③		
④		
⑤		
⑥		
⑦		
⑧		
⑨		

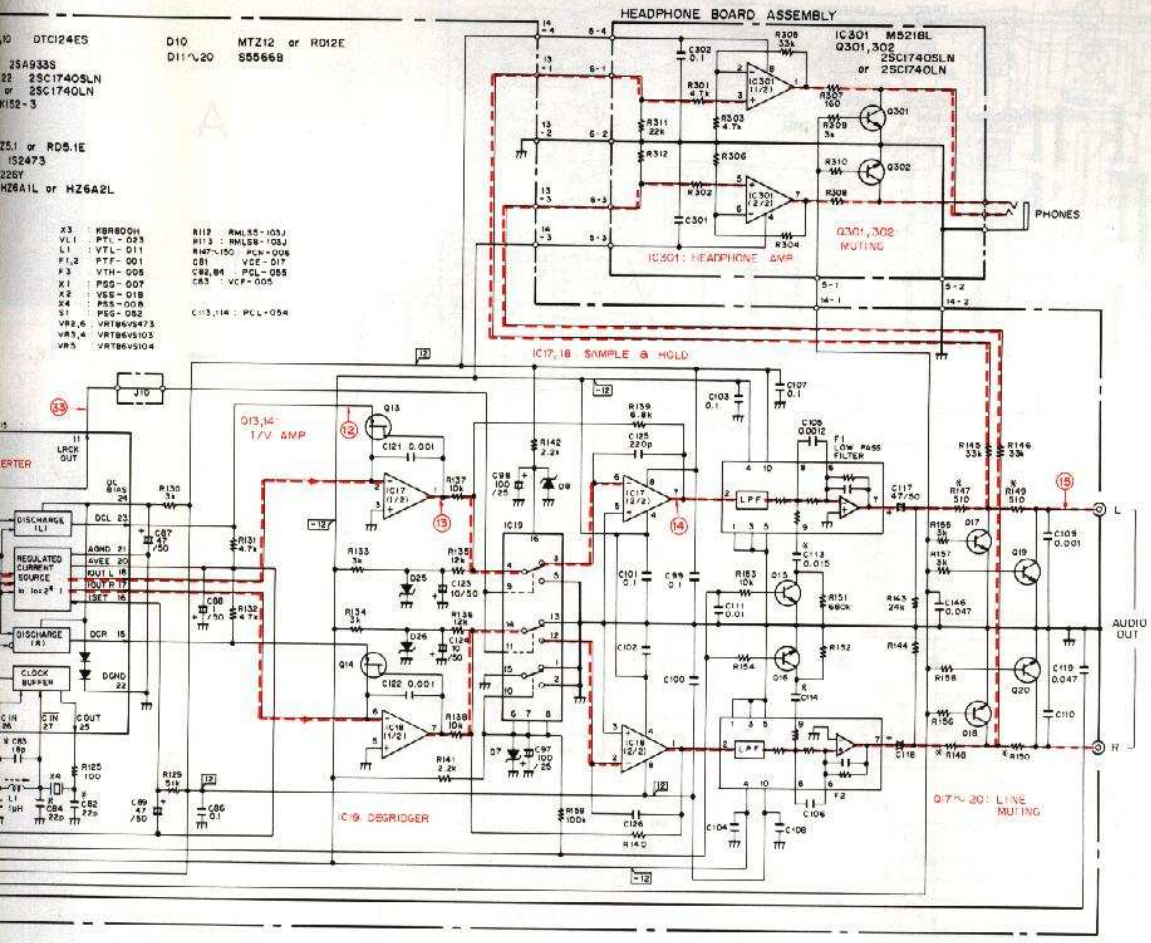
	PLAY	SEARCH
⑩		
⑪		
⑫		
⑬		
⑭		
⑮		
⑯		

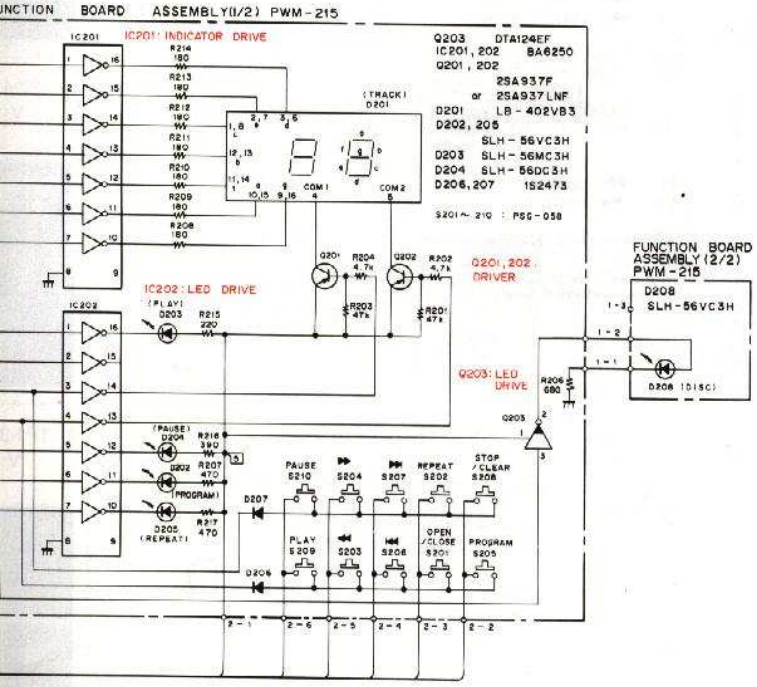
	POWER ON	POWER OFF
⑰		


PICKUP ASSEMBLY PWY-004
MAIN BOARD ASSEMBLY XWM-216
IC5 (1/21) RF AMP
IC1 1R3C01
AUTO POWER CONTROL
IC7 SERVO LOOP CONTROL
SERVO CONTROL
Q5 SWITCH
IC5(2/21 TRACKING ERROR AMP
IC4 LOADING DRIVE
IC2(2/21 TRACKING DRIVE
LOADING MOTOR
DIRECTION
LOADING IN
LOADING OUT

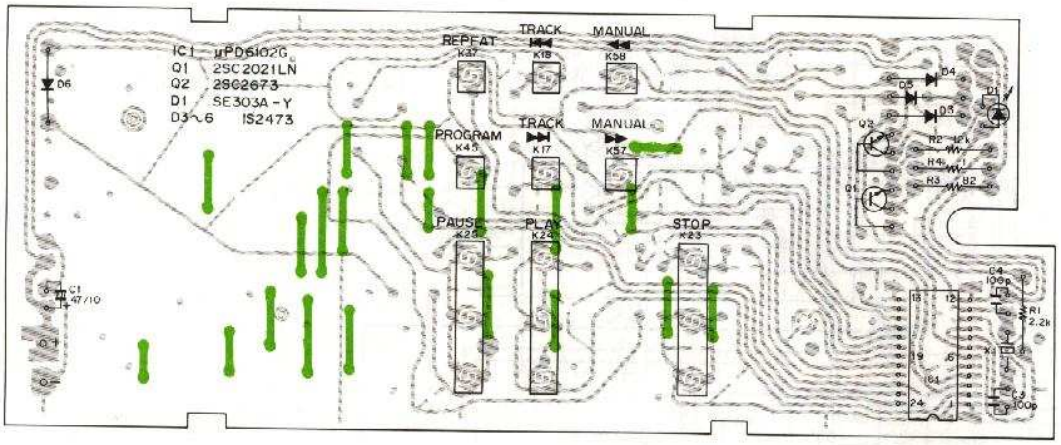

IC8 (2/2): VCO CONTROL
IC9: DECODER
VCO FREE RUNNING ADJ
PHASE COMPARISON
SUBCODE SYNC DETECTION
SUBCODE DEMODULATION
CRC CHECK
LATCH
EDGE DETECTION
23 BIT SHIFT REGISTER
EFM DEMODULATION
INTERPOLATION
PARALLEL /SERIAL CONVERTER
ERROR DETECTION AND CORRECTION
FRAME SYNC DETECTION, PROTECTION, INSERTION
VCO SYSTEM TIMING GENERATOR
CRYSTAL TIMING GENERATOR
CPU INTERFACE
CLV CONTROL
ROUGH SERVO
P.L.L. SERVO
FAST ACCESS SERVO
TRACKING COUNTER
RAM ADDRESS GENERATOR
FOCUS OK AMP
FOCUS OK COMPARATOR
EFM COMPARATOR
AUTO ASYMMETRY CONTROL AMP
Q1: SWITCH
Q5: INVERTER
Q7: SWITCH
Q2 SWITCH
IC2 (1/2): FOCUS DRIVE
IC8 (1/2): SPINDLE CONTROL
IC3 (2/2): SPINDLE DRIVE
SPINDLE MOTOR (FOWARD DIRECTION) PXM-147
DIRECTION
FOWARD
REVERSE
FOCUS AMP
FOCUS SEARCH ON/OFF
LATCH
LOGIC
ADDRESS DECODE
8 BIT SHIFT REGISTER
TTL → I²L
TRACKING AMP
SLED AMP
SLED ON/OFF
IC11 DECODER
Q9,10: INTER-FACE
S101: INSIDE PSH-007
S102: CLAMP PSH-003
CARRIAGE MOTOR (FOWARD DIRECTION) PYY-804
IC3 (1/2): CARRIAGE DRIVE
IC2 (2/2): TRACKING DRIVE
VR2: TRACKING OFFSET ADJ
IC12 SYSTEM CONTROL
S1 TEST
X1 8.4672MHz
X2 4MHz
X3 800kHz

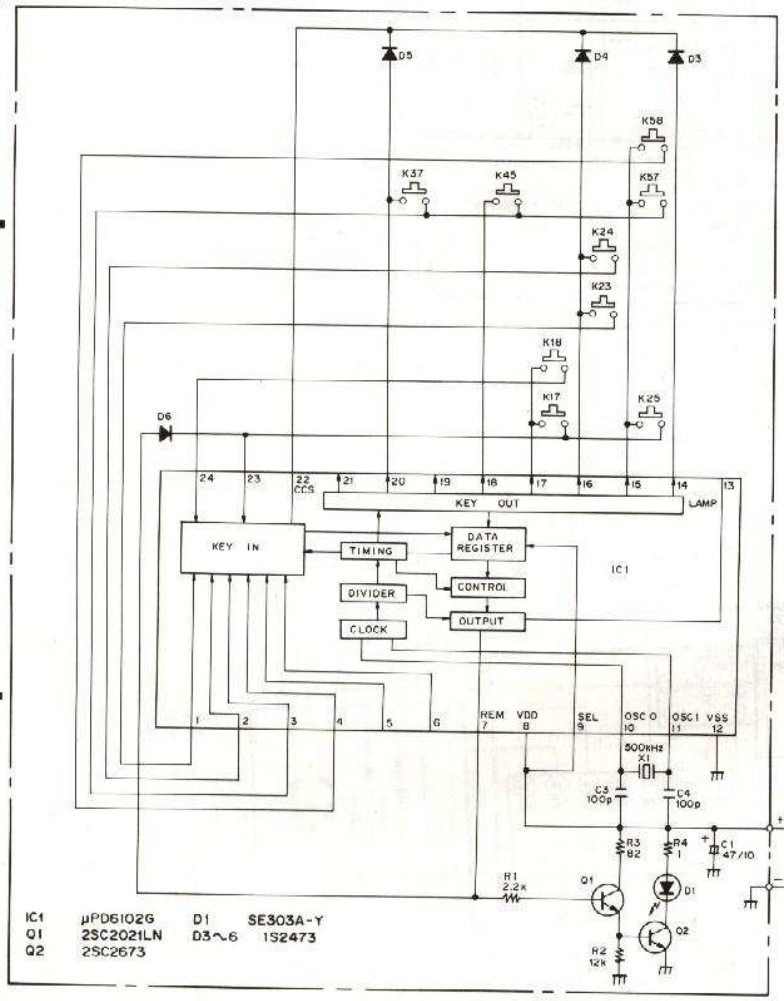

SUBCODE BOARD ASSEMBLY
Q501 DTC124ES INVERTER
JA501 SUBCODE OUT
IC2,3 TA7256P
IC4 BA6109
IC5 CX20109
IC6 CX20108
IC7 NJM4558S
IC8 NJM082S
IC9 CX23035
IC10 M5M5117FP
IC11 PDE003
IC12 PD3047
IC15 CX20152
IC17,18 NJM072DE
IC19 TC40538P
IC20 NJM79L12A
IC21 NJM78M12A
IC22 NJM79M08A
IC23 NJM78M05A
IC24,25 ICP-F15
Q2,3,6~8,10 DTC124ES
Q9,12,21 2SA933S
Q11,15~20,22 2SC1740SLN or 2SC1740LN
Q13,14 2SK152-3
D3 MTZ5.1 or RD5.1E
D5,9 1S2473
D6 KV1226Y
D7,8,25,26 HZ6A1L or HZ6A2L
CRYSTAL TIMING GENERATOR
IC10: RAM
D/A CONVERTER
SCLK OUTPUT
TTL~ECL INTERFACE CIRCUIT
TIMING GENERATOR CIRCUIT
UPPER 8 BIT SHIFT REGISTER, LATCH, COUNTER
LOWER 8 BIT SHIFT REGISTER, LATCH, COUNTER
CLOCK BUFFER
Q12 : SWITCH
REMOTE SENSOR RWX-096
Q9,10 : INTER-FACE
IC20~23: REGULATOR
Q11: RESET
Q21, 22: LINE MUTING
PRIMARY BOARD ASSEMBLY
S401 POWER VSA-008
AC 120V 60Hz
AC POWER CORD PDG-046
AC SOCKET UNSWITCHED 100W MAX PKN-003
IC24,25 IC PROTECTOR
FUNCTION BOARD


HEADPHONE BOARD ASSEMBLY
IC301 M5218L
Q301,302
2SC1740SLN
or 2SC1740LN
PHONES
Q301,302 MUTING
IC301 : HEADPHONE AMP
IC17,18 SAMPLE & HOLD
I/V AMP
LOW PASS FILTER
LPF
AUDIO OUT
L
R
IC19 DEGRIDGER
Q17~20 : LINE MUTING


FUNCTION BOARD ASSEMBLY(II/2) PWM-215
IC201 : INDICATOR DRIVE
IC202 : LED DRIVE
Q201,202 DRIVER
Q203 : LED DRIVE
FUNCTION BOARD ASSEMBLY (2/2) PWM-215
D208 SLH-56VC3H
PAUSE S210
PLAY S209
STOP / CLEAR S208
REPEAT S202
PROGRAM S205
OPEN / CLOSE S201

7.3 REMOTE CONTROL UNIT





IC1 μPD6102G D1 SE303A-Y
Q1 2SC2021LN D3~6 1S2473
Q2 2SC2673

1. RESISTORS.
Indicated in Ω, ¼W, ⅛ W, 5% tolerance unless otherwise noted k; kΩ, M; MΩ, (F), ±1%, (G), ±2%, (K), ±10%, (M); ±20% tolerance

2. CAPACITORS:
Indicated in capacity (μF)/voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.

3. OTHERS:
➡ ; Signal route.
⊘ ; Adjusting point.
The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
※ marked capacitors and resistors have parts numbers.

SWITCHES:

K17 : ⏭ (TRACK SEARCH)
K18 : ⏮ (TRACK SEARCH)
K23 : STOP
K24 : PLAY
K25 : PAUSE

K37 : REPEAT
K45 : PROGRAM

K57 : ⏩ (MANUAL SEARCH)
K58 : ⏪ (MANUAL SEARCH)

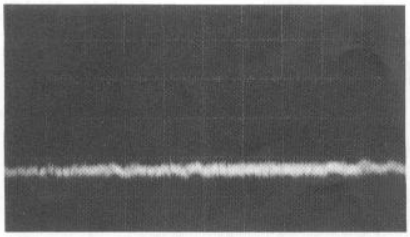
The underlined indicates the switch position.

This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

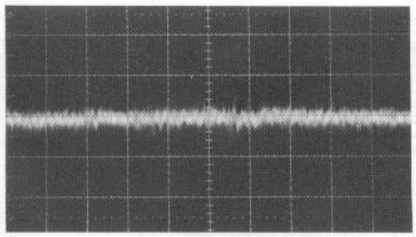
• Wave Form

NOTE: The encircled numbers denote measuring points in the circuit and pattern diagrams.

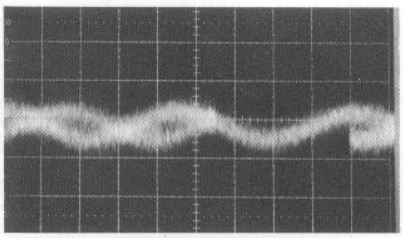
① PT2-2 MODE : PLAY
V : 200mV/div H: 2m sec/div



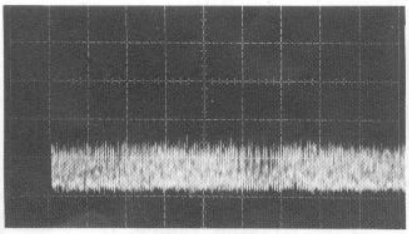
③ TP1-2 MODE : SEARCH
V : 500mV/div H: 5m sec/div



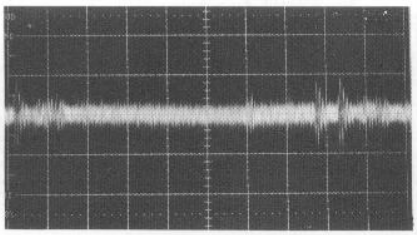
⑥ TP1-9 MODE : PLAY
V : 500mV/div H: 10m sec/div



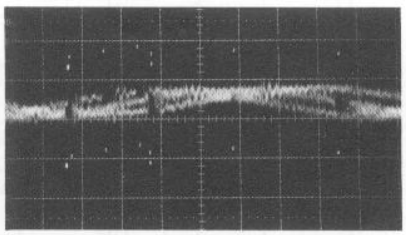
① TP2-2 MODE : SEARCH
V : 200mV/div H:2m sec/div



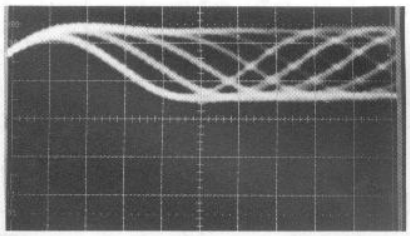
④ TP1-4 MODE : PLAY
V : 2V/div H: 20m sec/div



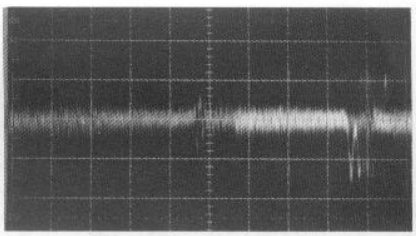
⑥ TP1-9 MODE : SEARCH
V : 500mV/div H: 10m sec/div



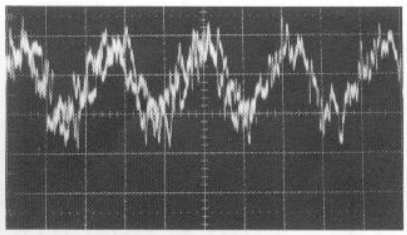
② TP2-4 MODE : PLAY
V : 1V/div H: 200n sec/div



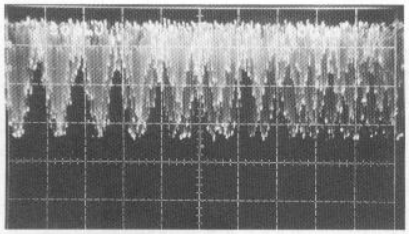
④ TP1-4 MODE : SEARCH
V : 2V/div H: 20m sec/div



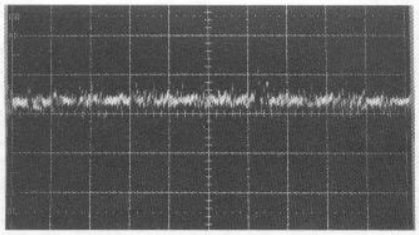
⑦ IC8-2 MODE : PLAY
V : 200mV/div H: 50m sec/div



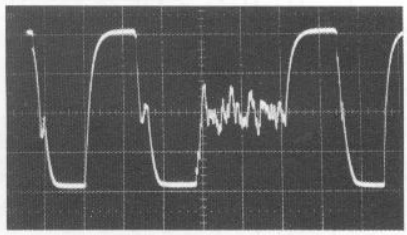
② TP2-4 MODE: SEARCH
V : 500mV/div H: 100μsec/div



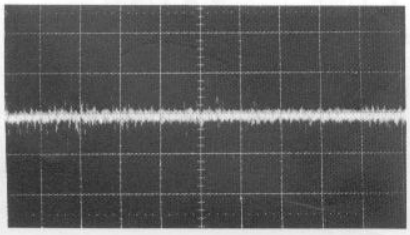
⑤ TP1-8 MODE : PLAY
V : 500mV/div H: 10m sec/div



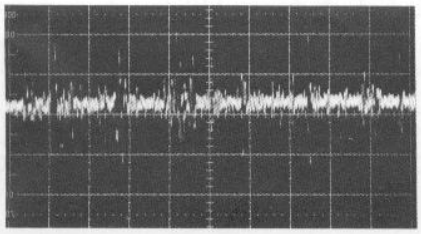
⑦ IC8-2 MODE : SEARCH
V : 2V/div H: 200m sec/div



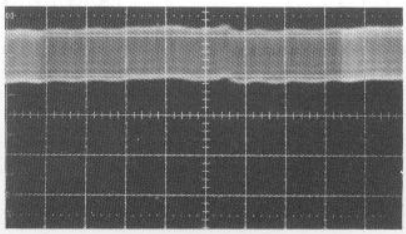
③ TP1-3 MODE : PLAY
V : 500mV/div H: 5m sec/div



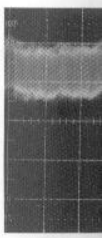
⑤ TP1-8 MODE : SEARCH
V : 500mV/div H: 10m sec/div



⑧ IC8-8 MODE : PLAY
V : 500mV/div H: 20m sec/div



⑧ IC8-8 MO
V : 50



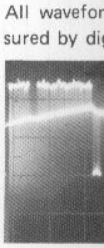
⑨ IC9-4 MO
V : 2V

⑨ IC9-4 MO
V : 2V

⑩ IC9-3 MO
V : 2V

⑩ IC9-3 MO
V : 2V

All wavefor
sured by di



rcuit and

ec/div

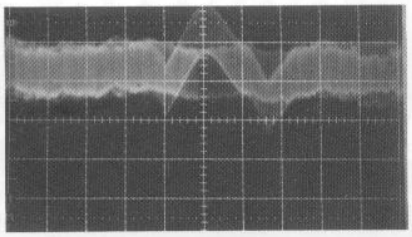
ec/div

sec/div

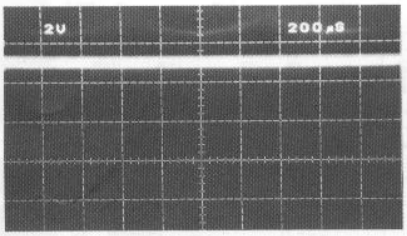
sec/div

sec/div

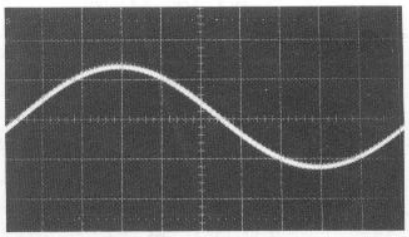
⑧ IC8-8 MODE : SEARCH
V : 500mV/div H: 20m sec/div



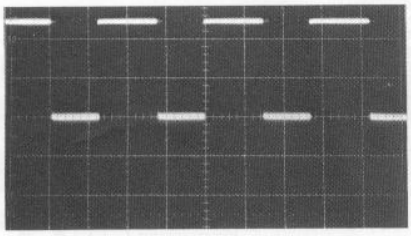
⑪ TP4-1 MODE : PLAY
V : 2V/div H: 20m sec/div



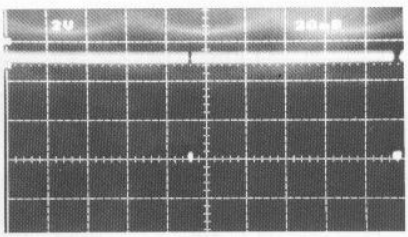
⑭ IC17-7 MODE : PLAY
V : 2V/div H: 100μsec/div



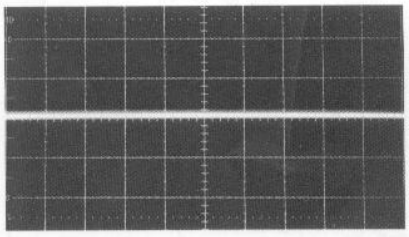
⑨ IC9-4 MODE : PLAY
V : 2V/div H: 50μsec/div



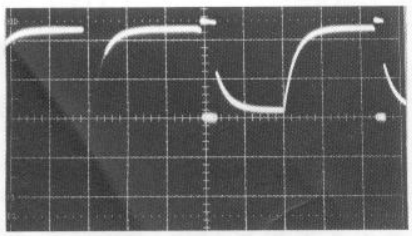
⑪ TP4-1 MODE : SEARCH
V : 2V/div H: 200μsec/div



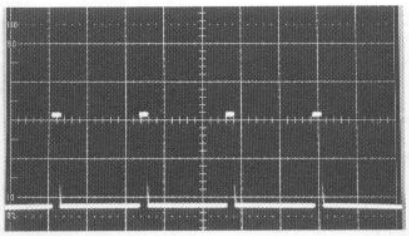
⑭ IC17-7 MODE : SEARCH
V : 2V/div H: 100μsec/div



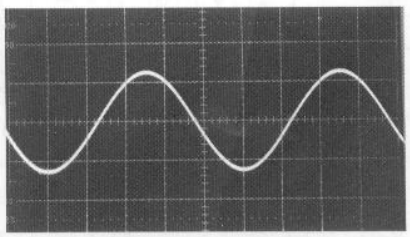
⑨ IC9-4 MODE : SEARCH
V : 2V/div H:100m sec/div



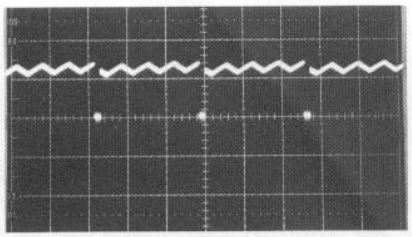
⑫ IC15-23 MODE : PLAY or SEARCH
V : 2V/div H: 5μsec/div



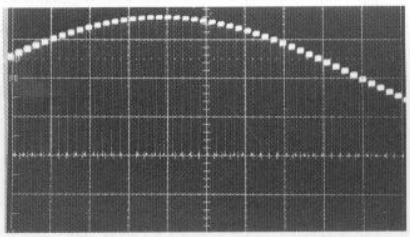
⑮ OUT L MODE : PLAY
V : 2V/div H: 200μsec/div



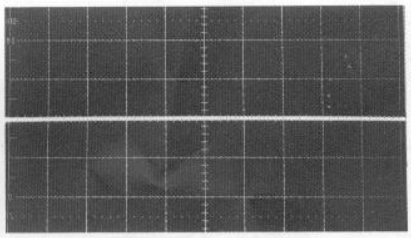
⑩ IC9-3 MODE : PLAY
V : 2V/div H: 200μsec/div



⑬ IC17-1 MODE : PLAY
V : 2V/div H: 50μsec/div

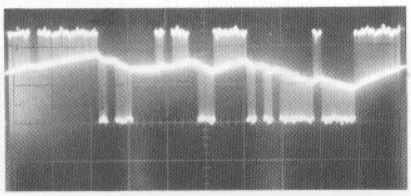


⑮ OUT L MODE : SEARCH
V : 2V/div H: 200μsec/div

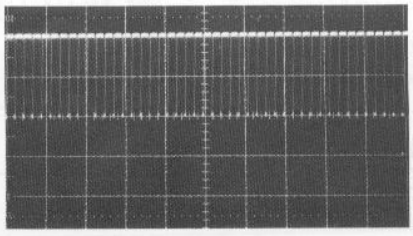


⑩ IC9-3 MODE : SEARCH
V : 2V/div H: 10m sec/div

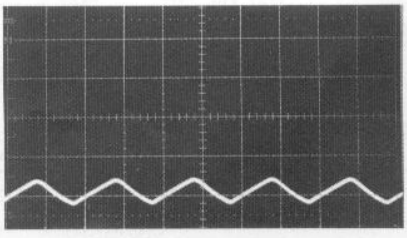
All waveforms shown here have been measured by digitizer.



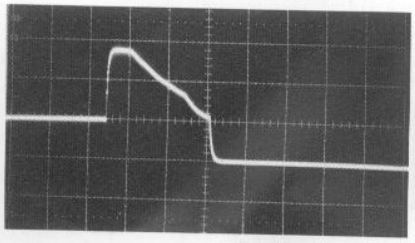
⑬ IC17-1 MODE : SEARCH
V : 2V/div H: 50μsec/div



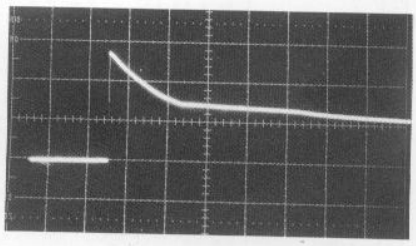
⑯ D9-anode MODE : PLAY or SEARCH
V : 2V/div H: 5m sec/div



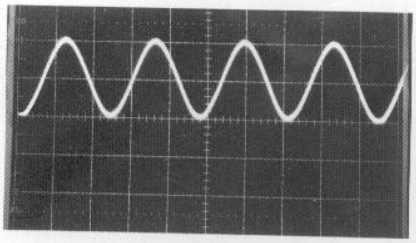
⑰ Q21-C POWER ON
V: 5V/div H: 1 sec/div



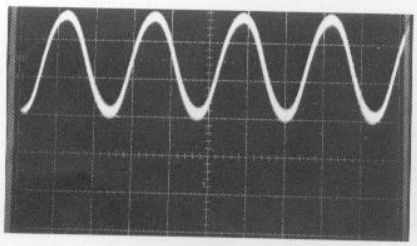
⑰ Q21-C POWER OFF
V: 5V/div H: 500m sec/div



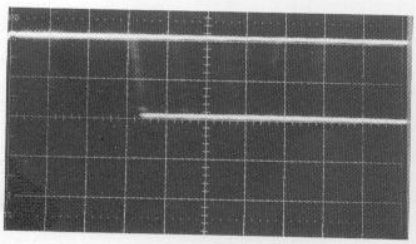
⑱ IC9-9 MODE : STOP
V: 2V/div H: 50m sec/div



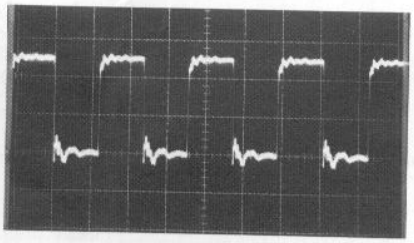
⑲ IC9-8 MODE : STOP
V: 1V/div H: 50m sec/div



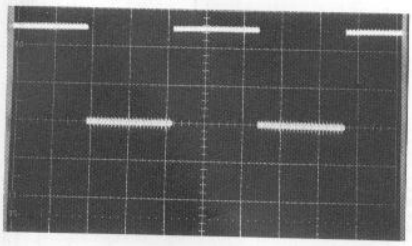
⑳ IC9-5 MODE : PLAY
V: 2V/div H: 200 sec/div



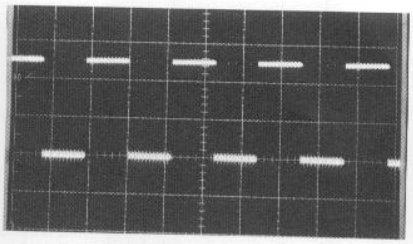
㉑ IC9-76 MODE : STOP
V: 2V/div H: 200m sec/div



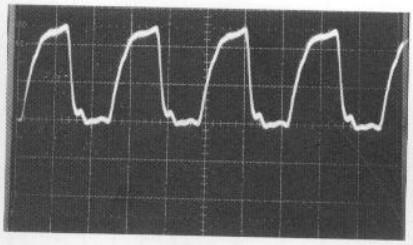
㉒ IC9-80 MODE : STOP
V: 2V/div H: 5μsec/div



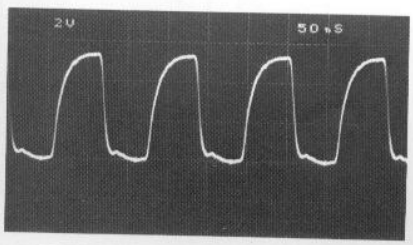
㉓ IC9-79 MODE : STOP
V: 2V/div H: 5μsec/div



㉔ IC9-53 MODE : STOP
V: 2V/div H: 50n sec/div



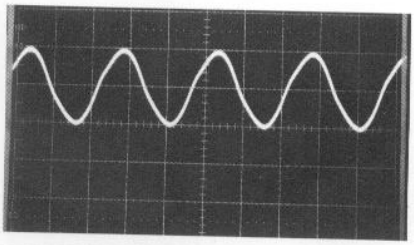
㉕ IC9-54 MODE : STOP
V: 2V/div H: 50n sec/div



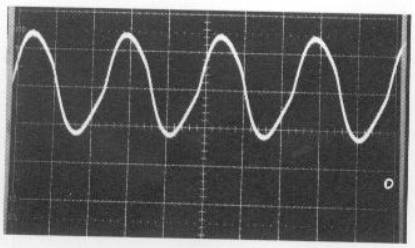
㉖

㉗

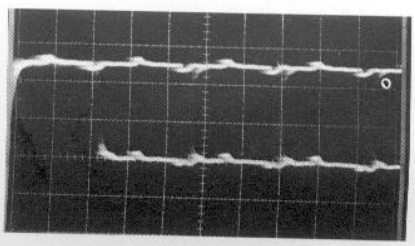
㉘ IC12-6 MODE : STOP
V: 2V/div H: 100n sec/div

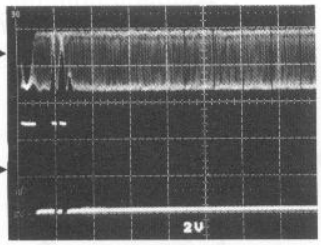
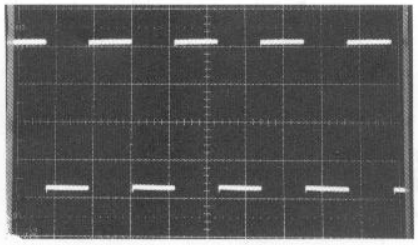


㉙ IC12-5 MODE : STOP
V: 2V/div H: 100n sec/div



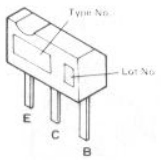
㉚ IC15-10 MODE: PLAY
V: 2V/div H: 200n sec/div



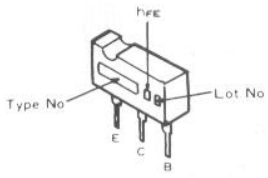
㉛ IC 5-18 MODE : STOP V : 2V/div 2m sec/div IC5-3 (RF) IC5-18 (MIRR) 	㉝ IC15-11 MODE : STOP V : 2V/div H: 5μsec/div 	㉟
㉜	㉞	㊱

External Appearance of Transistors and ICs

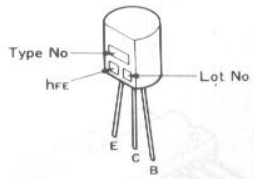
2SC2021LN



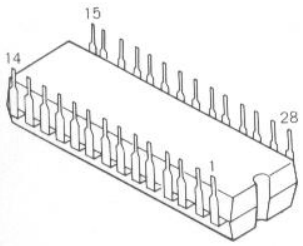
2SC2673



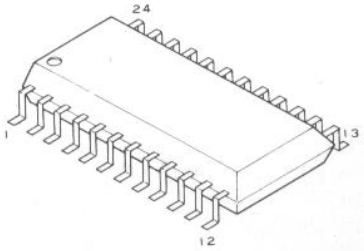
2SC3377



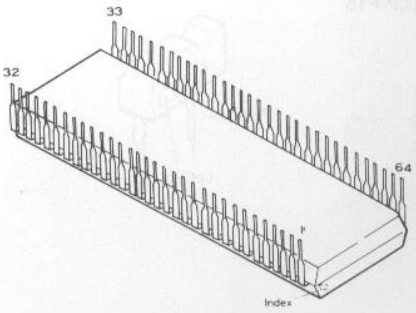
PDE003



CX20109
M5M5117FP
μPD6102G



PD3047



Defective power supply

Check for breaks in solder bridge pattern

Check power switch and power cord

120V/60Hz TYP values

	IN	OUT
IC21	+16 ~ 17V	+12V
IC22	−16 ~ −17V	−12V
IC23	+10 ~ 11V	+5V
IC24	−10 ~ −11V	−5V
Q23	Collector −30V to −33V	Emitter −26V

Power on /off switching noise

Is the Q21 collector at H level (about +10V) when the power is switched on or off?

NO → Check D9 thru D12, C131, C132, and R155 thru R158 for solder bridges and other soldering faults

YES

Check Q17 thru Q20 and R155 thru R158 for solder bridges and other soldering faults

TYP values

Is the Q11 collector at H level?

NO → Is the D9 anode about −6V?

NO → Check R167 thru R173, D11 and D12, and C131 for solder bridges and other soldering faults

YES

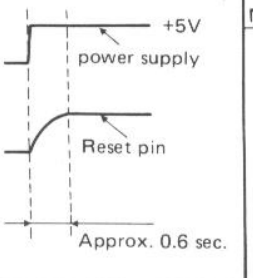
YES

Is input applied to IC6, IC9, IC11, and IC12?

NO → Check around R120, Q11 and C73 for solder bridges and other soldering faults

YES

Is the reset time constant normal?

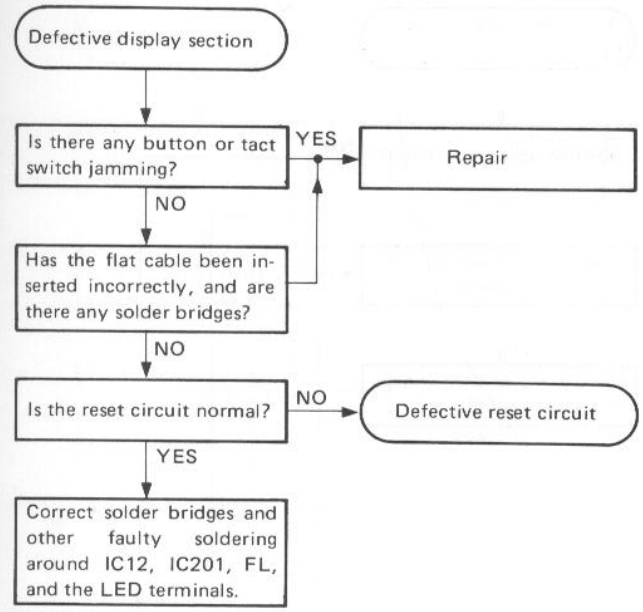


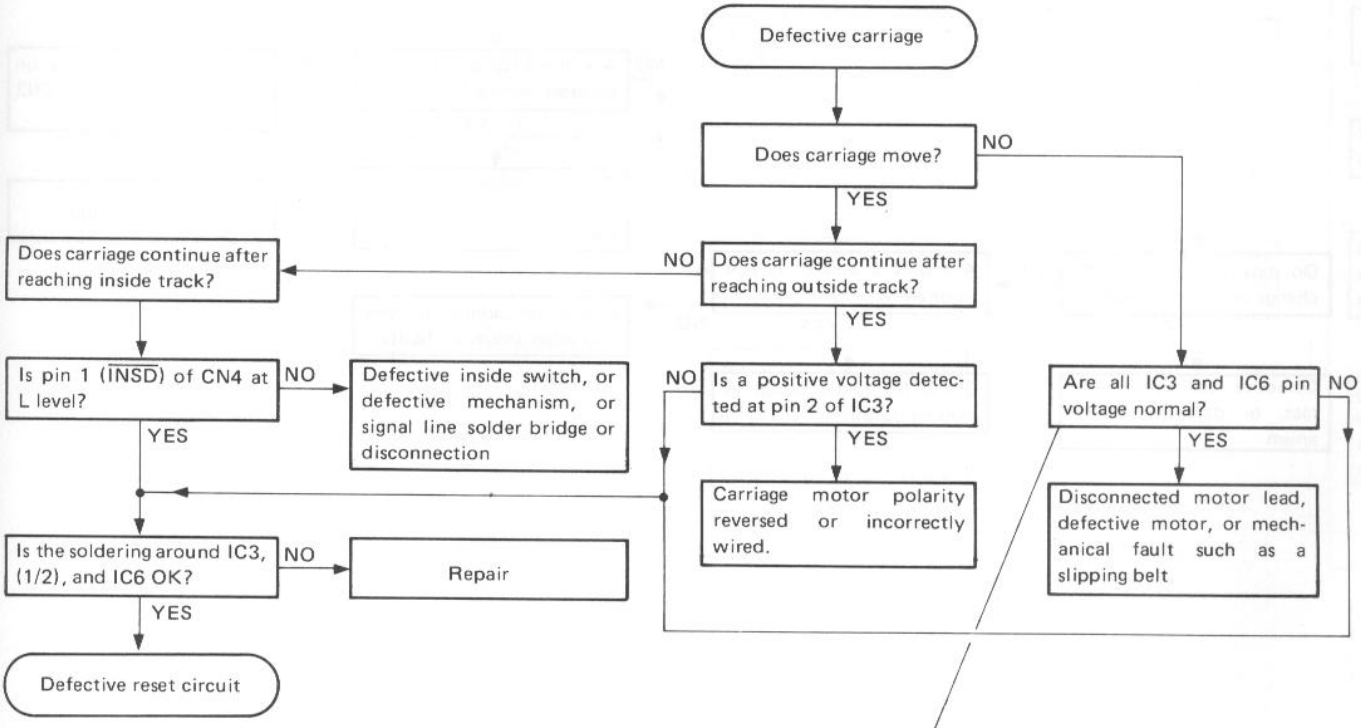
NO → Check for solder bridges, pattern cracks, and other soldering faults

NO → Check around R118, R121 and C74 for solder bridges and other soldering faults

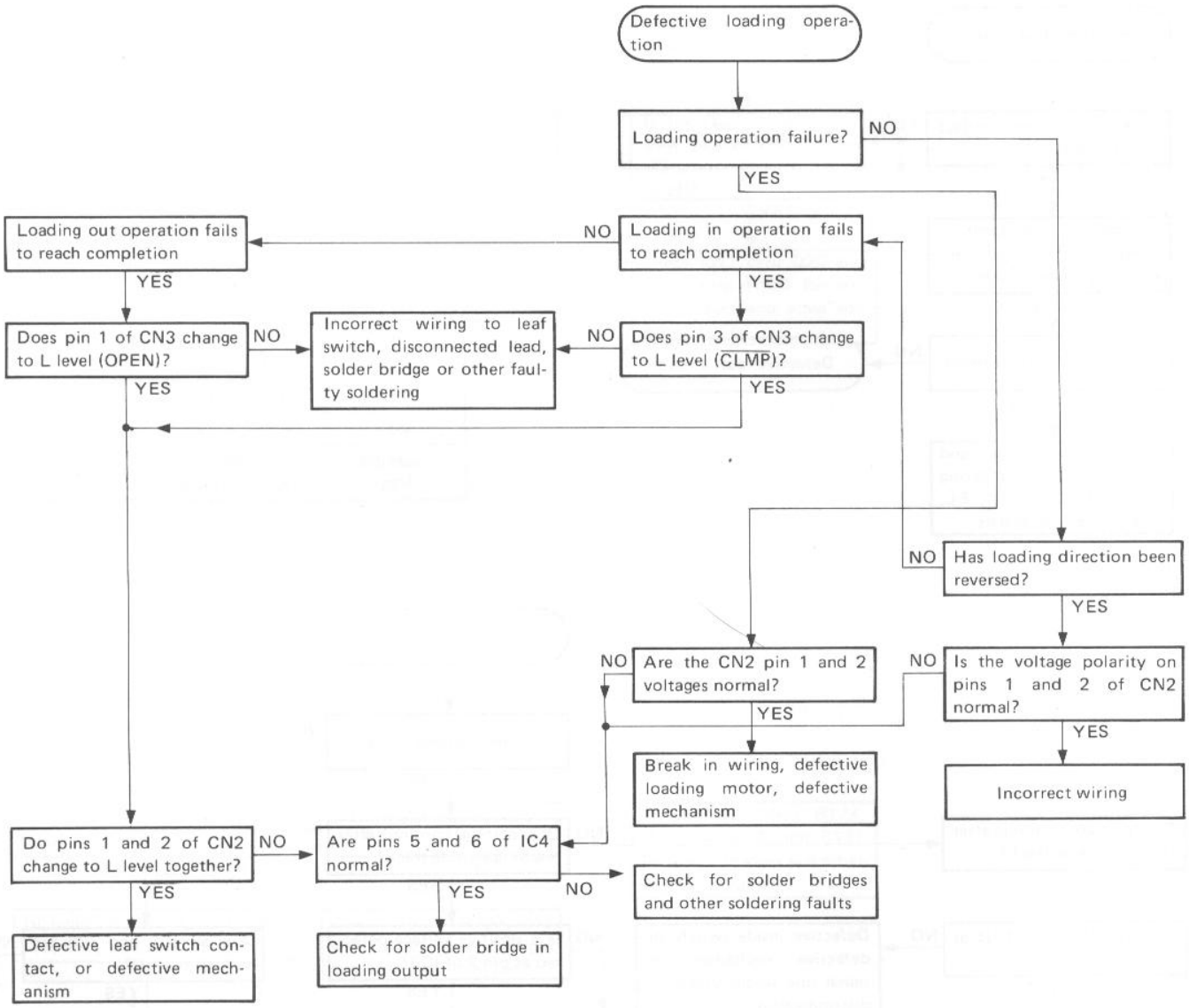
YES

Normal

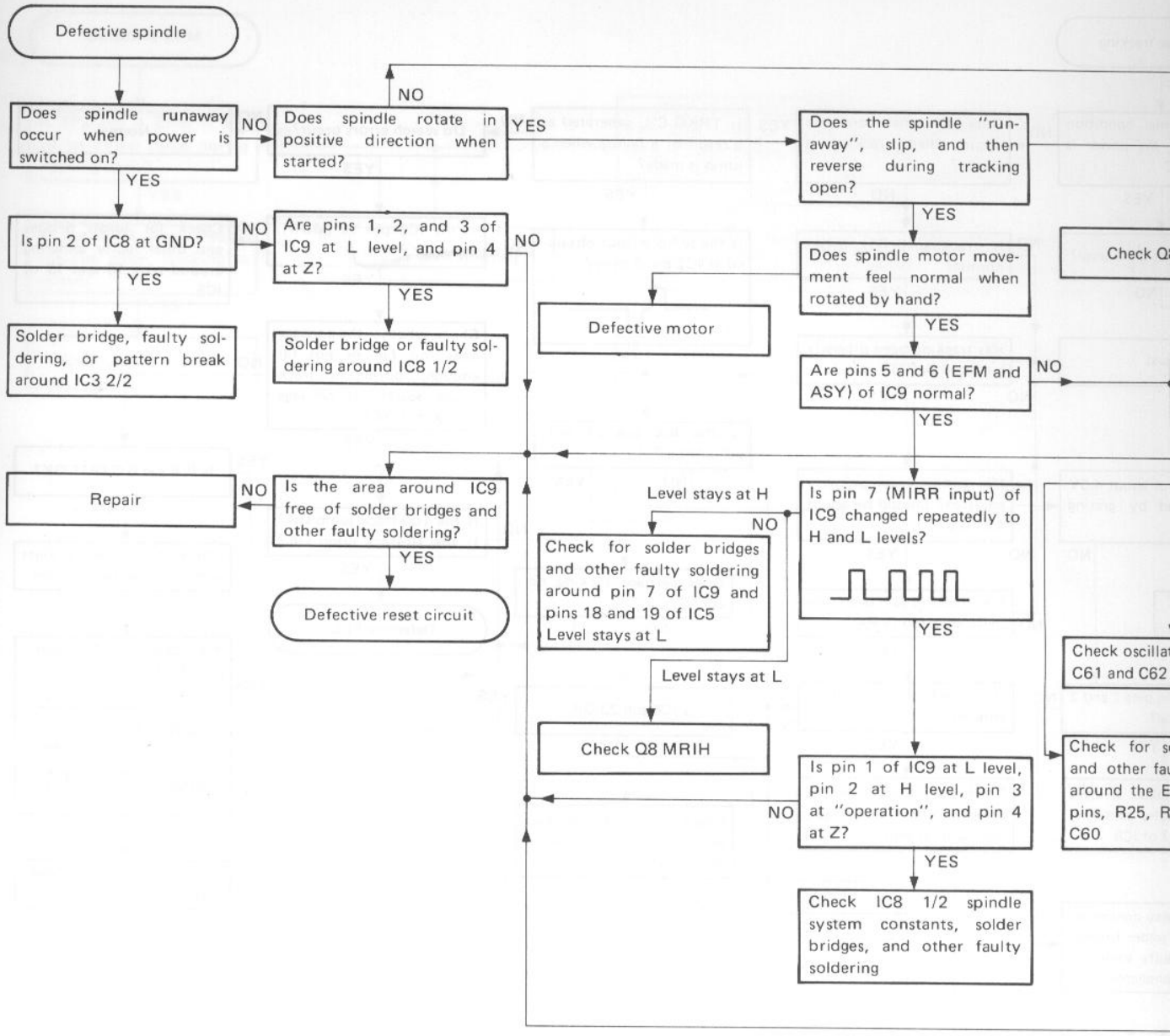


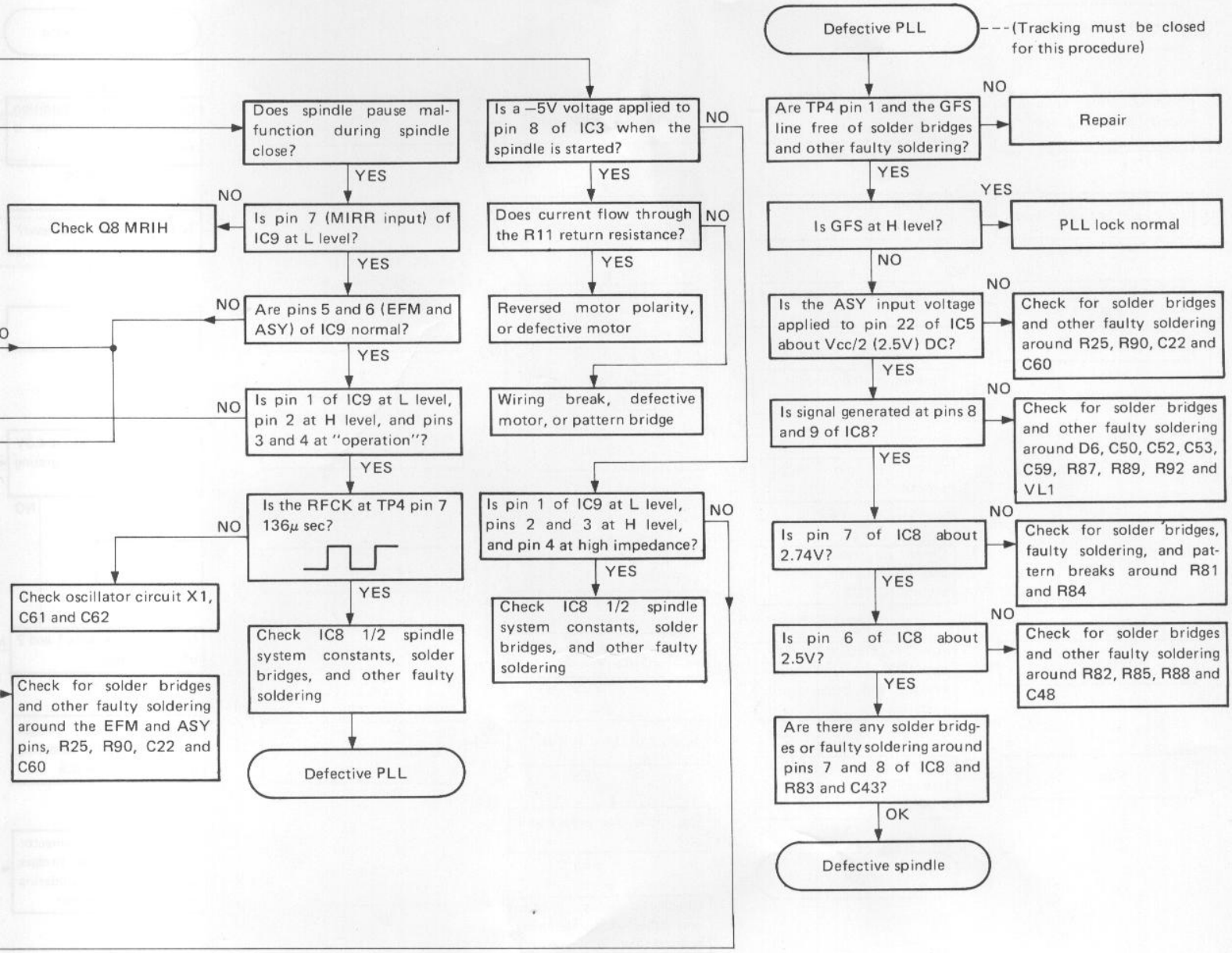


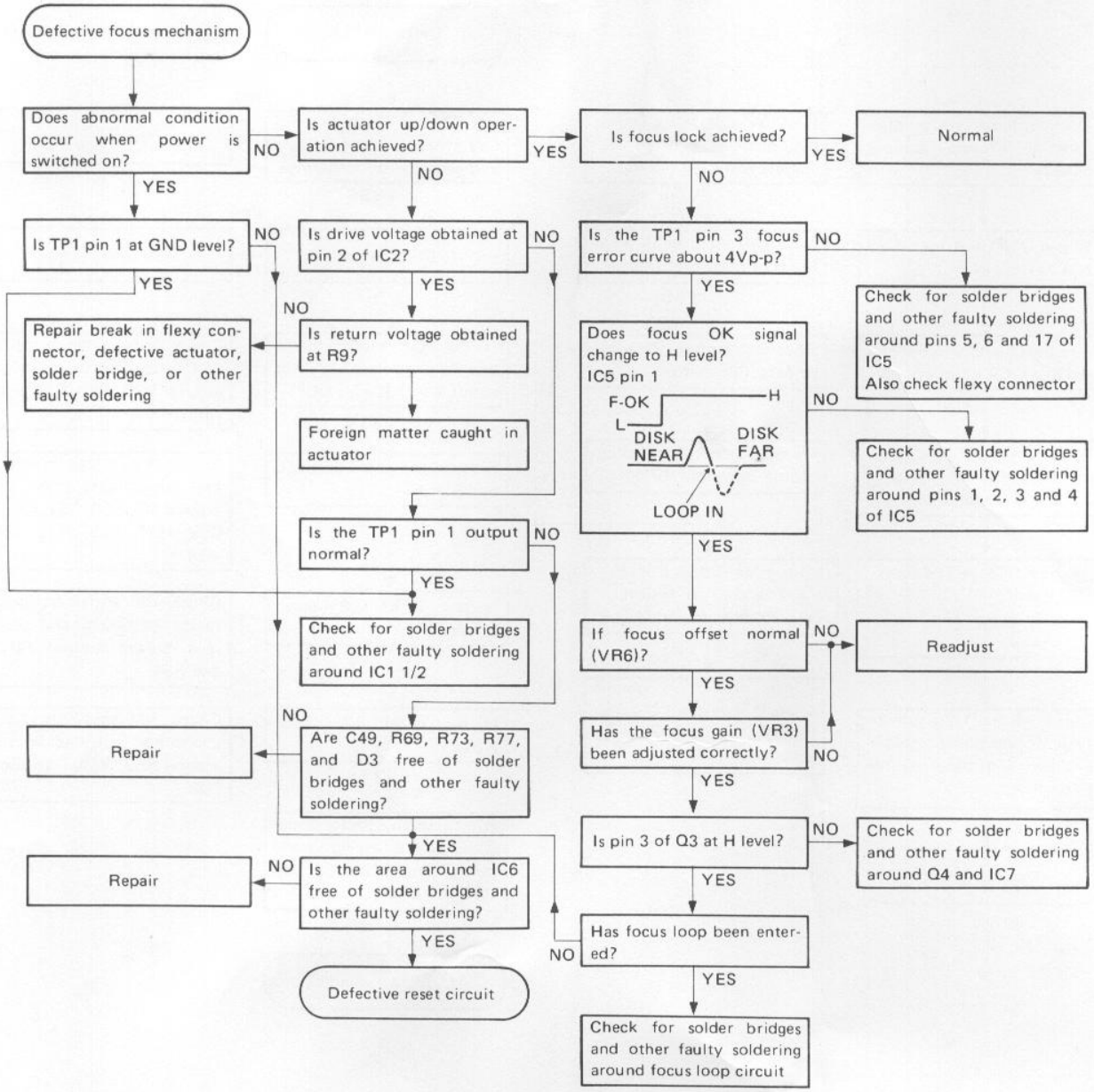
Mode \ Point	IC3 2 Pin	IC6 23 Pin
Playback	+1 ~ −2V	+0.09 ~ −0.18V
Forward (outer tracks)	−9 ~ −11V	−0.8 ~ −1V
Reverse (inner tracks)	+9 ~ +11V	+0.8 ~ 1V
Stop	0V	0V

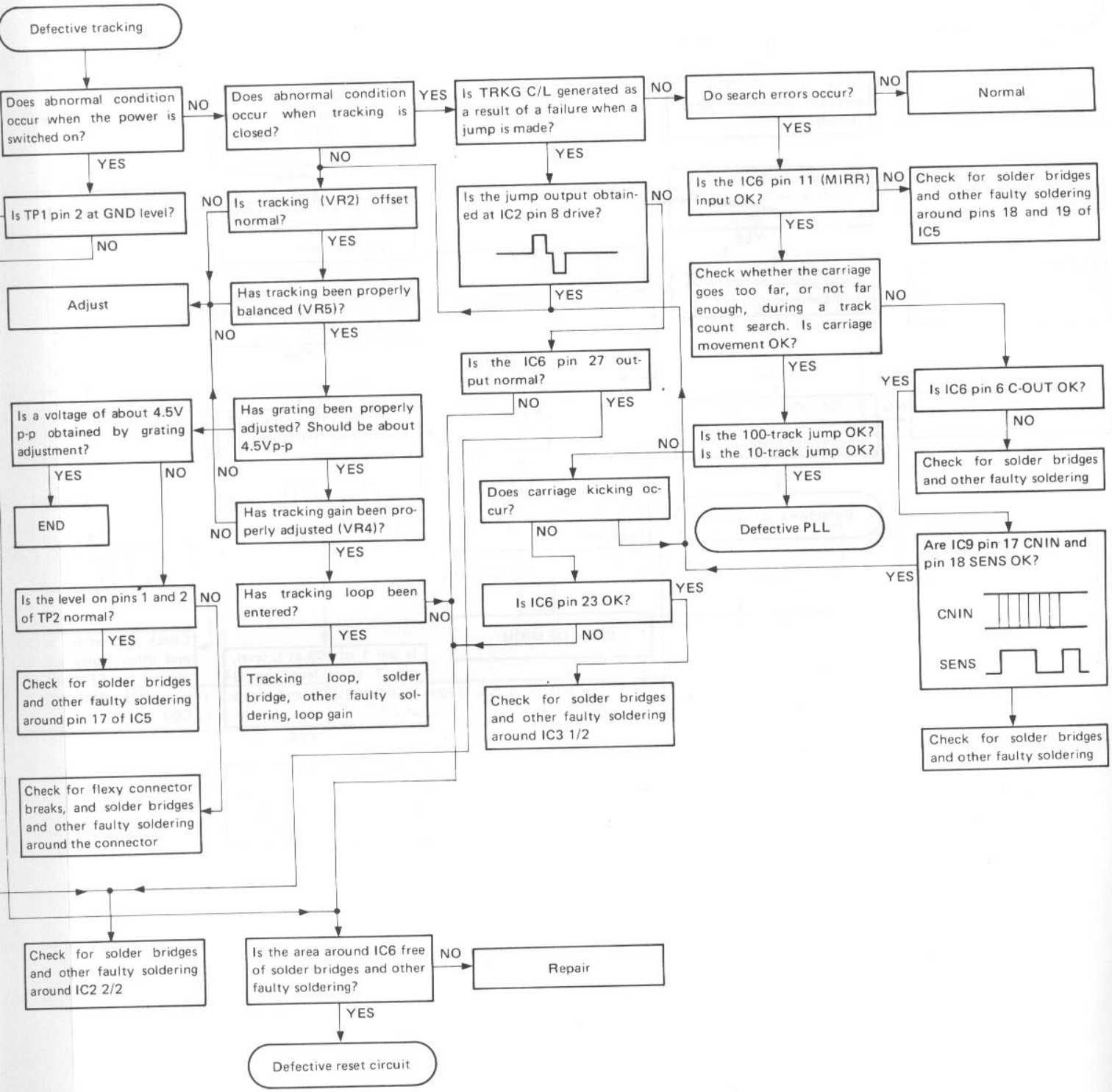


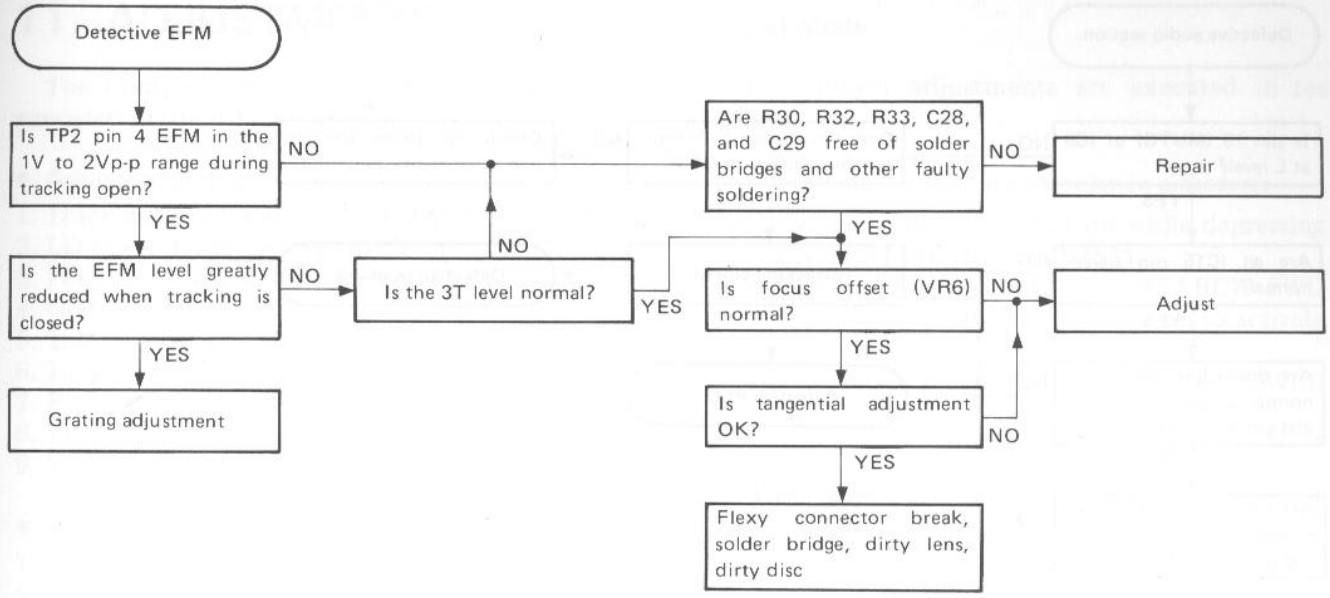
Point / Mode	IC4 5 Pin	IC4 6 Pin	CN2 1 Pin	CN2 2 Pin
Loading in	L	H	0V	+8 ~ 10V
Loading out	H	L	+8 ~ 10V	0V
Loading in completed	H	H	0V	0V
Loading out completed	L	L	0V	0V

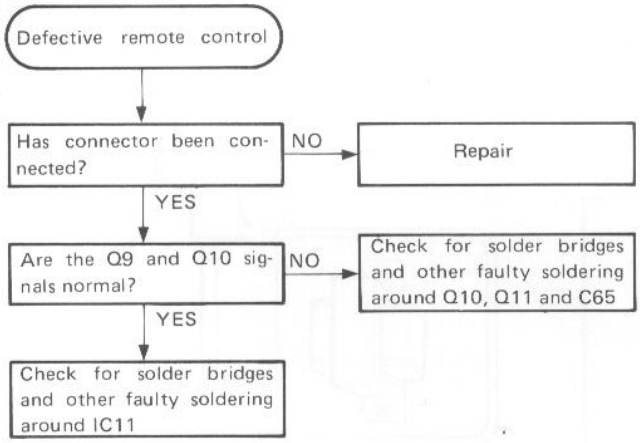

Defective spindle
Does spindle runaway occur when power is switched on?
NO
YES
Does spindle rotate in positive direction when started?
NO
YES
Does the spindle "runaway", slip, and then reverse during tracking open?
YES
Is pin 2 of IC8 at GND?
NO
YES
Are pins 1, 2, and 3 of IC9 at L level, and pin 4 at Z?
NO
YES
Does spindle motor movement feel normal when rotated by hand?
YES
Check Q
Solder bridge, faulty soldering, or pattern break around IC3 2/2
Solder bridge or faulty soldering around IC8 1/2
Defective motor
Are pins 5 and 6 (EFM and ASY) of IC9 normal?
NO
YES
Repair
NO
Is the area around IC9 free of solder bridges and other faulty soldering?
YES
Defective reset circuit
Level stays at H
NO
Is pin 7 (MIRR input) of IC9 changed repeatedly to H and L levels?
YES
Check for solder bridges and other faulty soldering around pin 7 of IC9 and pins 18 and 19 of IC5
Level stays at L
Level stays at L
Check Q8 MRIH
Check oscilla
C61 and C62
Check for s
and other fa
around the E
pins, R25, R
C60
Is pin 1 of IC9 at L level, pin 2 at H level, pin 3 at "operation", and pin 4 at Z?
NO
YES
Check IC8 1/2 spindle system constants, solder bridges, and other faulty soldering

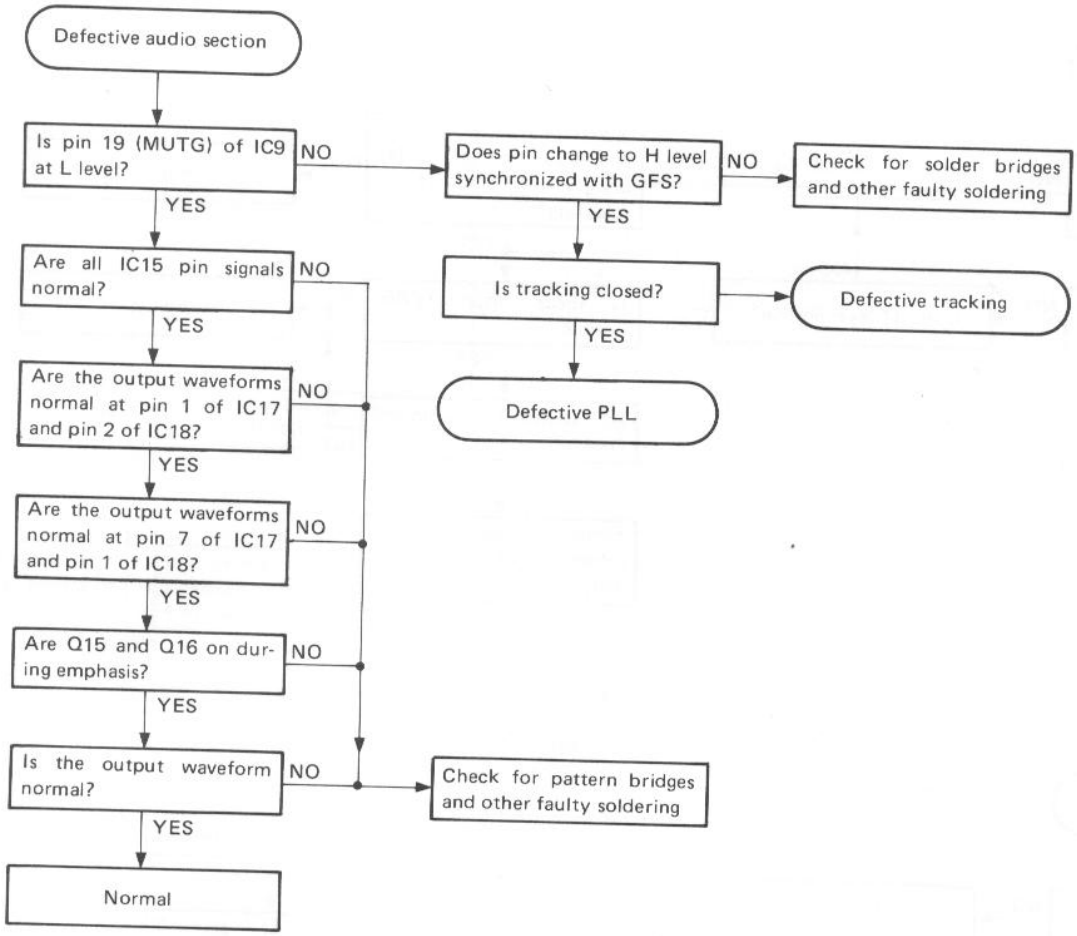

Defective PLL
---(Tracking must be closed for this procedure)
Are TP4 pin 1 and the GFS line free of solder bridges and other faulty soldering?
NO
Repair
YES
Is GFS at H level?
YES
PLL lock normal
NO
Is the ASY input voltage applied to pin 22 of IC5 about Vcc/2 (2.5V) DC?
NO
Check for solder bridges and other faulty soldering around R25, R90, C22 and C60
YES
Is signal generated at pins 8 and 9 of IC8?
NO
Check for solder bridges and other faulty soldering around D6, C50, C52, C53, C59, R87, R89, R92 and VL1
YES
Is pin 7 of IC8 about 2.74V?
NO
Check for solder bridges, faulty soldering, and pattern breaks around R81 and R84
YES
Is pin 6 of IC8 about 2.5V?
NO
Check for solder bridges and other faulty soldering around R82, R85, R88 and C48
YES
Are there any solder bridges or faulty soldering around pins 7 and 8 of IC8 and R83 and C43?
OK
Defective spindle
Is a −5V voltage applied to pin 8 of IC3 when the spindle is started?
NO
YES
Does current flow through the R11 return resistance?
NO
YES
Reversed motor polarity, or defective motor
Wiring break, defective motor, or pattern bridge
Is pin 1 of IC9 at L level, pins 2 and 3 at H level, and pin 4 at high impedance?
NO
YES
Check IC8 1/2 spindle system constants, solder bridges, and other faulty soldering
Does spindle pause malfunction during spindle close?
YES
NO
Check Q8 MRIH
Is pin 7 (MIRR input) of IC9 at L level?
YES
NO
Are pins 5 and 6 (EFM and ASY) of IC9 normal?
YES
NO
Is pin 1 of IC9 at L level, pin 2 at H level, and pins 3 and 4 at "operation"?
YES
Is the RFCK at TP4 pin 7 136μ sec?
NO
Check oscillator circuit X1, C61 and C62
YES
Check IC8 1/2 spindle system constants, solder bridges, and other faulty soldering
Check for solder bridges and other faulty soldering around the EFM and ASY pins, R25, R90, C22 and C60
Defective PLL


Defective focus mechanism
Does abnormal condition occur when power is switched on?
NO
YES
Is actuator up/down operation achieved?
YES
NO
Is focus lock achieved?
YES
Normal
NO
Is TP1 pin 1 at GND level?
NO
YES
Is drive voltage obtained at pin 2 of IC2?
NO
YES
Is the TP1 pin 3 focus error curve about 4Vp-p?
NO
YES
Check for solder bridges and other faulty soldering around pins 5, 6 and 17 of IC5
Also check flexy connector
Repair break in flexy connector, defective actuator, solder bridge, or other faulty soldering
NO
Is return voltage obtained at R9?
YES
Foreign matter caught in actuator
Does focus OK signal change to H level?
IC5 pin 1
F-OK
H
L
DISK NEAR
DISK FAR
LOOP IN
NO
Check for solder bridges and other faulty soldering around pins 1, 2, 3 and 4 of IC5
Is the TP1 pin 1 output normal?
NO
YES
Check for solder bridges and other faulty soldering around IC1 1/2
If focus offset normal (VR6)?
NO
Readjust
YES
Repair
NO
Are C49, R69, R73, R77, and D3 free of solder bridges and other faulty soldering?
Has the focus gain (VR3) been adjusted correctly?
NO
YES
Is pin 3 of Q3 at H level?
NO
Check for solder bridges and other faulty soldering around Q4 and IC7
YES
Repair
NO
Is the area around IC6 free of solder bridges and other faulty soldering?
YES
Has focus loop been entered?
NO
YES
Defective reset circuit
Check for solder bridges and other faulty soldering around focus loop circuit
Defective tracking
Does abnormal condition occur when the power is switched on?
YES
YES
Is TP1 pin 2 at GND level?
NO
Adjust
Is a voltage of about 4.5V p-p obtained by grating adjustment?
YES
NO
END
Is the level on pins 1 and 2 of TP2 normal?
YES
Check for solder bridges and other faulty soldering around pin 17 of IC5
Check for flexy connector breaks, and solder bridges and other faulty soldering around the connector
Check for solder bridges and other faulty soldering around IC2 2/2


Defective tracking
Does abnormal condition occur when the power is switched on?
NO
YES
Does abnormal condition occur when tracking is closed?
YES
NO
Is TRKG C/L generated as a result of a failure when a jump is made?
NO
YES
Do search errors occur?
NO
YES
Normal
Is TP1 pin 2 at GND level?
NO
Adjust
Is tracking (VR2) offset normal?
NO
YES
Has tracking been properly balanced (VR5)?
NO
YES
Is the jump output obtained at IC2 pin 8 drive?
NO
YES
Is the IC6 pin 11 (MIRR) input OK?
NO
YES
Check for solder bridges and other faulty soldering around pins 18 and 19 of IC5
Check whether the carriage goes too far, or not far enough, during a track count search. Is carriage movement OK?
NO
YES
Is IC6 pin 6 C-OUT OK?
YES
NO
Check for solder bridges and other faulty soldering
Is IC6 pin 27 output normal?
NO
YES
Is the 100-track jump OK? Is the 10-track jump OK?
NO
YES
Defective PLL
Is a voltage of about 4.5V p-p obtained by grating adjustment?
YES
NO
END
Has grating been properly adjusted? Should be about 4.5Vp-p
NO
YES
Has tracking gain been properly adjusted (VR4)?
NO
YES
Does carriage kicking occur?
NO
Are IC9 pin 17 CNIN and pin 18 SENS OK?
YES
CNIN
SENS
Check for solder bridges and other faulty soldering
Is the level on pins 1 and 2 of TP2 normal?
NO
YES
Check for solder bridges and other faulty soldering around pin 17 of IC5
Has tracking loop been entered?
NO
YES
Tracking loop, solder bridge, other faulty soldering, loop gain
Is IC6 pin 23 OK?
YES
NO
Check for solder bridges and other faulty soldering around IC3 1/2
Check for flexy connector breaks, and solder bridges and other faulty soldering around the connector
Check for solder bridges and other faulty soldering around IC2 2/2
Is the area around IC6 free of solder bridges and other faulty soldering?
NO
Repair
YES
Defective reset circuit


Detective EFM
Is TP2 pin 4 EFM in the 1V to 2Vp-p range during tracking open?
NO
YES
Is the EFM level greatly reduced when tracking is closed?
NO
YES
Grating adjustment
Is the 3T level normal?
NO
YES
Are R30, R32, R33, C28, and C29 free of solder bridges and other faulty soldering?
NO
Repair
YES
Is focus offset (VR6) normal?
NO
Adjust
YES
Is tangential adjustment OK?
NO
YES
Flexy connector break, solder bridge, dirty lens, dirty disc


Defective remote control
Has connector been connected?
NO
Repair
YES
Are the Q9 and Q10 signals normal?
NO
Check for solder bridges and other faulty soldering around Q10, Q11 and C65
YES
Check for solder bridges and other faulty soldering around IC11


Defective audio section
Is pin 19 (MUTG) of IC9 at L level?
NO
Does pin change to H level synchronized with GFS?
NO
Check for solder bridges and other faulty soldering
YES
YES
Are all IC15 pin signals normal?
NO
Is tracking closed?
Defective tracking
YES
YES
Are the output waveforms normal at pin 1 of IC17 and pin 2 of IC18?
NO
Defective PLL
YES
Are the output waveforms normal at pin 7 of IC17 and pin 1 of IC18?
NO
YES
Are Q15 and Q16 on during emphasis?
NO
YES
Is the output waveform normal?
NO
Check for pattern bridges and other faulty soldering
YES
Normal

11. ADJUSTMENTS

The Compact Disc Player adjustment are to be executed in the following order.

• Adjustment Items

1. Tracking offset and focus offset adjustments
2. LD (laser diode) power check
3. Focus lock and spindle lock checks
4. Grating adjustment
5. Tracking balance adjustment
6. Tangential adjustment
7. Focus gain adjustment
8. Tracking gain adjustment
9. VCO free-run frequency adjustment

• Measuring Equipment

1. Dual trace oscilloscope
2. Optical power meter
3. Test disc (YEDS7)
4. Focus and tracking adjustment filters
5. Loop gain adjustment bandpass filter
6. Signal generator
7. Grating driver
8. Other regular measuring equipment

• Test Mode

Disc player adjustments are executed in test mode.

Test mode setting and cancellation procedures

(1) Switch POWER (S401) on while depressing the TEST MODE switch (S1).
(2) Then switch the MANUAL SEARCH FWD (▷▷) or REV (◁◁) switch on to activate test mode.
(3) Test mode is cancelled by switching POWER off.

The various key functions during test mode are listed in Table 11-1.

• Adjustment Controls

VR2: Tracking offset (TR.OF)
VR3: Focus gain (FO.GA)
VR4: Tracking gain (TR.GA)
VR5: Tracking balance (TR.BL)
VR6: Focus offset (FO.OF)
VL1: VCO free run (VCO coil)

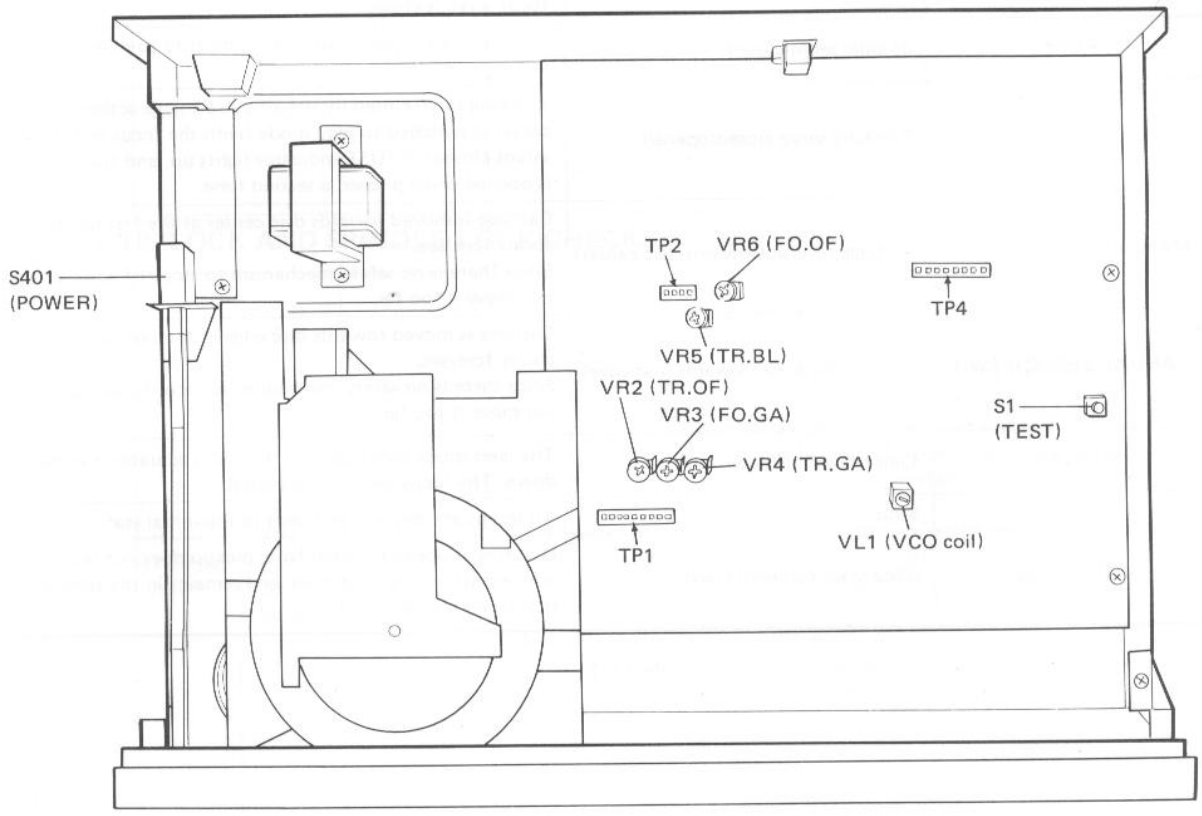
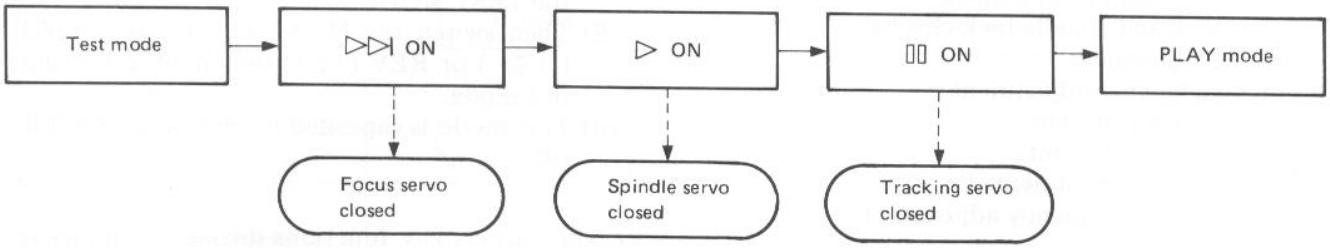


Fig. 11-1 Adjustment Points

During test mode, each servo mechanism can be closed and opened by separate operations. Consequently, each servo must be closed one at a time (in serial sequence) to set play mode. Note that play mode is not activated by simply pressing the PAUSE key (▯▯) during test mode.

Example: Switch from stop to play mode.



- The servo mechanisms comply with a serial sequence during test mode.

• Key Function in Test Mode

Symbol	Key	Function during test mode	Description
▷▷|	TRACK FWD	Focus servo closed	Laser diode lights up, focus actuator is moved up/down, and focus servo is closed.
▷	PLAY	Spindle servo closed	Spindle servo closed in CLV-A mode after spindle motor is kicked.
▯▯	PAUSE	Tracking servo closed/opened	Tracking servo closed by pressing in a toggle action, and player is switched to play mode (with the focus and spindle servos closed). PAUSE indicator lights up, and tracking servo is opened when pressed a second time.
◁◁	MANUAL SEARCH REV	Carriage reverse (towards disc center)	Carriage is moved towards disc center at the fast speed of about 1cm/sec. Since there is no safety mechanism to stop the carriage, do not move it too far.
▷▷	MANUAL SEARCH FWD	Carriage forward (towards disc edge)	Carriage is moved towards disc edge at the fast speed of about 1cm/sec. Since there is no safety mechanism to stop the carriage, do not move it too far.
▭	REPEAT	Lens moved up/down	The laser diode lights up, and the focus actuator is moved up/down. The focus servo is not closed.
□	STOP	Stop	All servos are stopped and reset to the initial status.
⏏	OPEN/CLOSE	(Disc tray) opened/closed	Disc tray is opened/closed. Note pickup does not return to arm rest when tray is opened, and remains in the same position when tray is closed.

Table 11-1

Step No.	Oscilloscope position V	Oscilloscope position H	Test points	Adjustment positions	Check items/ Adjustment specifications	Adjustment procedure
1	**TRACKING OFFSET AND FOCUS OFFSET ADJUSTMENTS**					
			TP 1 Pin 9 (TR. RT)	VR 2 (TR. OF)	0V ± 10mV	• Set the player to test mode (see page 53) • Adjust the voltage at TP1 pin 9 TR.RT (tracking return) to 0V ±10mV by turning the VR2 TR.OF (tracking offset) control.
			TP 1 Pin 3 (FO. ER)	VR 6 (FO.OF)	0V ± 10mV	• Adjust the voltage at TP1 pin 3 FO.ER (focus error) to 0V ±10mV by turning the VR6 FO.OF (focus offset) control.
2	**LD (LASER DIODE) POWER CHECK**					
				VR 1	Specified rating (0.26mW ± 0.02mW)	• Set to normal mode. (Normal mode can be set by switching the power off and on again.) • Position the optical power meter sensor immediately above the object lens. • Press the PLAY key without a disc loaded, and check that the LD (laser diode) power reading in the optical power meter is within the specified rating range (0.26mW ±0.02 mW).
3	**FOCUS LOCK AND SPINDLE LOCK CHECKS**					
	V 0.5V/div	H 100msec /div	TP2 pin 4 (RF output)		RF output generated Normal rotation	• Load the test disc. • Set the player to test mode (see page 53) • Press the MANUAL SEARCH FWD key (▷▷) to move the pick-up to about the center of the disc. Note that step must be executed. • Observe TP2 pin 4 RF (RF output) by oscilloscope to check that an RF output signal is generated when the TRACK FWD key (▷▷|) is pressed. • Press the PLAY key (▷) and check that the disc rotates at normal speed (about 300rpm near the center of the disc) in the correct direction (clockwise).

Step No.	Oscilloscope position V	Oscilloscope position H	Test points	Adjustment positions	Check items/ Adjustment specifications	Adjustment procedure
4	GRATING ADJUSTMENT					
						• Load the test disc.
						• Set the player to test mode (see page 53)
						• Press the TRACK FWD (▷▷|) and PLAY (▷) keys in that order to close the focus and spindle servos (leaving the tracking servo open).
						• Using the MANUAL SEARCH FWD key (▷▷), move the pick-up to a positon near the center of the disc, and ensure that the grating driver (R-122) can enter the pick-up grating adjustment hole from the left hand side of the set by the pick-up movement. (See Figure 11-3)
			TP 1 Pin 4 (TR. ER)	Grating	NULL point	• Observe the TP1 pin 4 TR.ER (tracking error) waveform by oscilloscope. Insert a 4kHz cut-off low pass filter at this stage. (See Figure 11-2)
						• Insert the tracking driver into the adjustment hole and turn the driver to find the NULL point (see Photograph 11-1).
						• At this stage, gently press against the pick-up with a screwdriver etc as indicated in Figure 11-3 to prevent the pick-up from rising when the grating driver is tuned.
				Grating	Maximum amplitude	• Next turn the grating driver slowly clockwise from the NULL point and adjust to the positon where the waveform (tracking error signal) first reaches maximum amplitude (see Figure 11-3). *Note:* *Press the down on the grating driver to ensure that the pick-up does not float upwards.*
			X axis TP2 pin 1 (BKTE) Y axis TP2 pin 2 (FWTE)	Grating	Lissajous 45°	• Connect TP2 pin 1 (BKTE) to the X axis of the oscilloscope, and pin 2 (FWTE) to the Y axis by AC coupling, and observe the Lissajous pattern (see Photograph 11-4). • Fine adjust the grating driver to a position where the Lissajous pattern in practically as straight line (Lissajous 45°). (See Photograph 11-5)

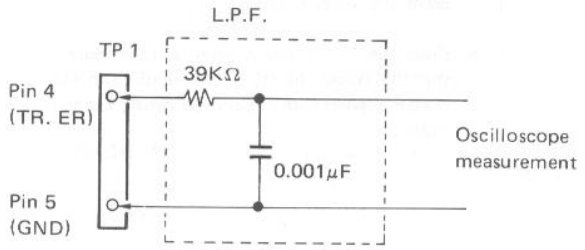


Fig. 11-2

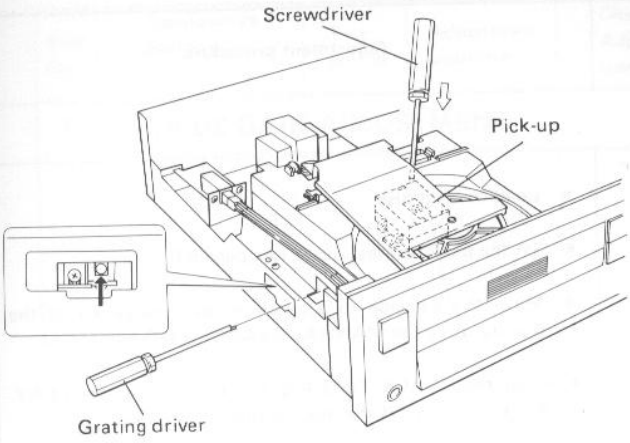
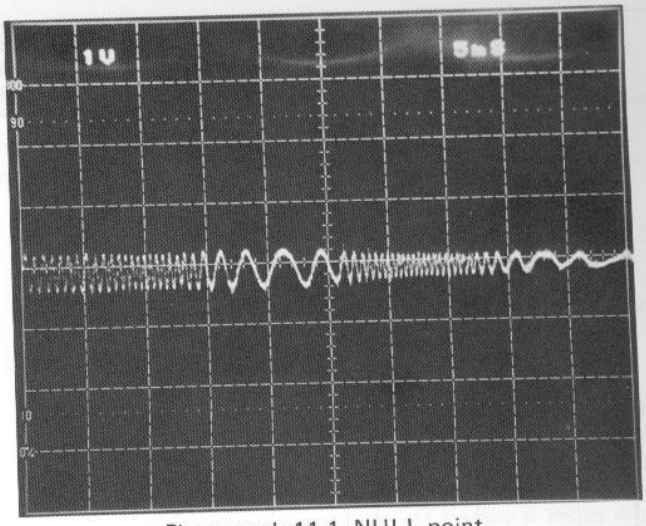
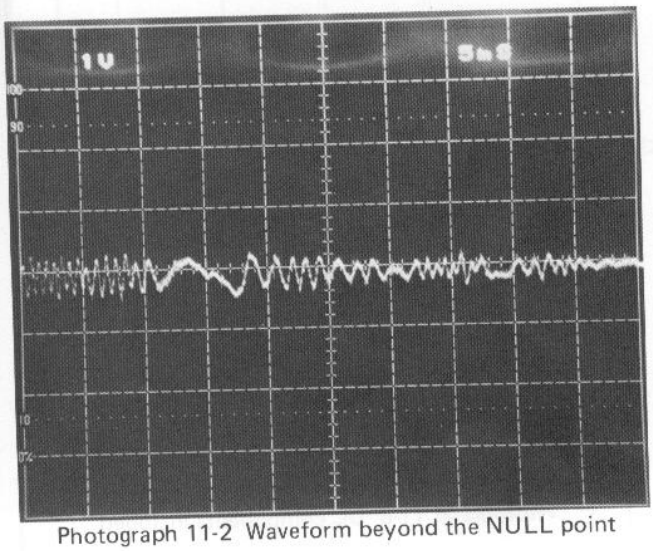


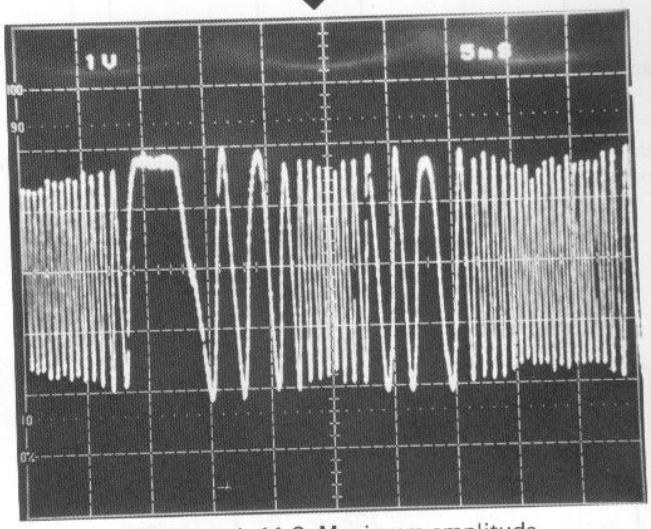
Fig. 11-3 Grating Adjustment



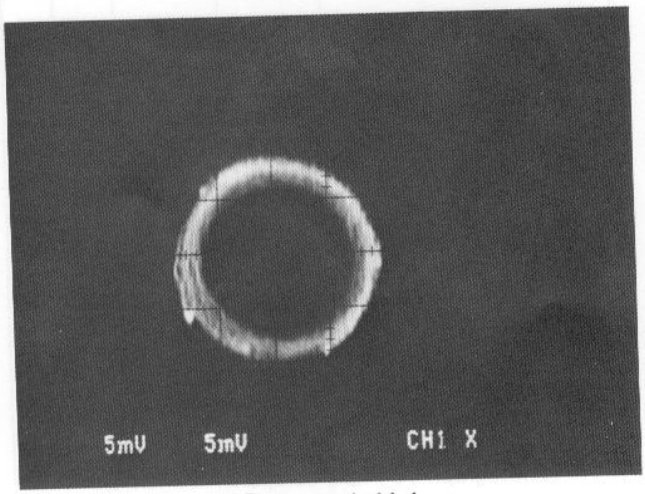
Photograph 11-1 NULL point



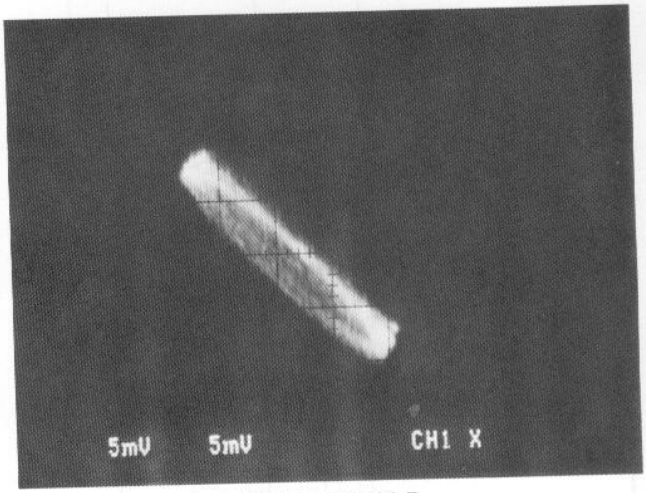
Photograph 11-2 Waveform beyond the NULL point



Photograph 11-3 Maximum amplitude

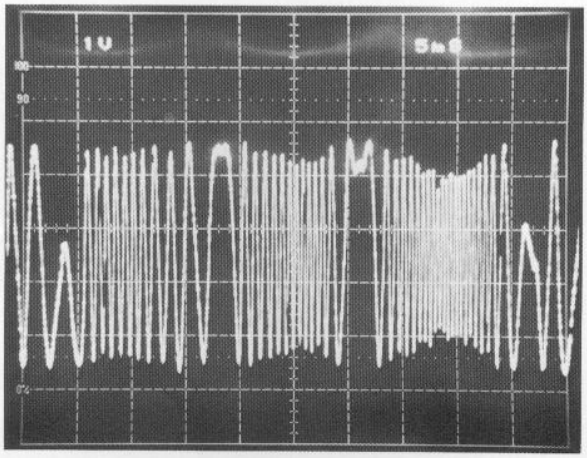


Photograph 11-4

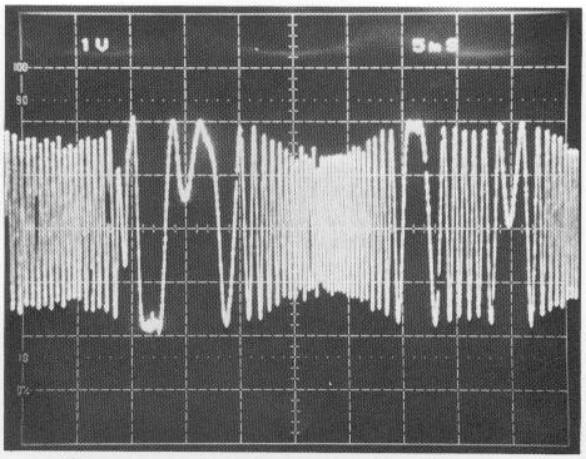


Photograph 11-5

Step No.	Oscilloscope position V	Oscilloscope position H	Test points	Adjustment positions	Check items/ Adjustment specifications	Adjustment procedure
5	TRACKING BALANCE ADJUSTMENT					
	1V/div	5msec /div	TP 1 Pin 4 (TR. ER)	VR 5 (TR. BL)		• Load the test disc. • Set the player to test mode (see page 53) • Move the carriage to a position near the center of the disc by using the MANUAL SEARCH FWD key (▷▷). • Press the TRACK FWD key (▷▷I) and then the PLAY key (▷) to start the disc turning. • Observe TP1 pin 4 TR.ER (tracking error) in the oscilloscope, and eliminate the DC component of the tracking error by adjustment the VR5 TR.BL (tracking balance) control.



Photograph 11-6 DC components included



Photograph 11-7 DC components excluded

Step No.	Oscilloscope position V	Oscilloscope position H	Test points	Adjustment positions	Check items/ Adjustment specifications	Adjustment procedure
6	TANGENTIAL ADJUSTMENT					
			TP2 pin 4 (RF output)	Tangential adjustment screw	Best eye pattern	• Load the test disc. • Set the player to test mode (see page 53) • Using the MANUAL SEARCH FWD key (▷), move the pick-up to the disc edge to enable the tangential adjustment screw to be seen from the left hand side (see Figure 11-5). • Press the TRACK FWD (▷▷I), PLAY (▷), and PAUSE (▯▯) keys in that order to close all servos, (The PAUSE indicator will light up.) • Observe the TP2 pin 4 RF (RF output) in the oscilloscope and adjust the tangential adjustment screw to obtain the clearest eye pattern. (Figure 11-5). • The optimum position is the midpoint between the two positions where the eye pattern starts to deteriorate when the tangential adjustment screw is turned clockwise and counter clockwise. Guidelines for this adjustment: In addition to a clear overall waveform, adjust to obtain relatively slender lines (see photograph 11-8) Where single "diamond" shapes are formed in the eye pattern. • To make the waveform easier to observe, insert a 10 kohm resistance (or 5 kohm if the waveform is hard to see) in the tip of the probe as shown in Figure 11-4.

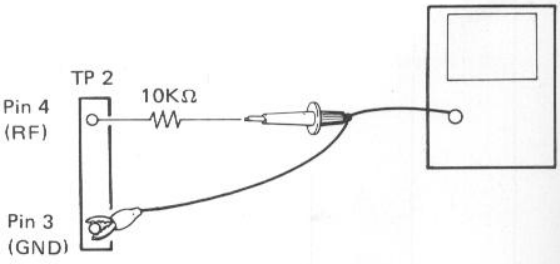


Fig. 11-4

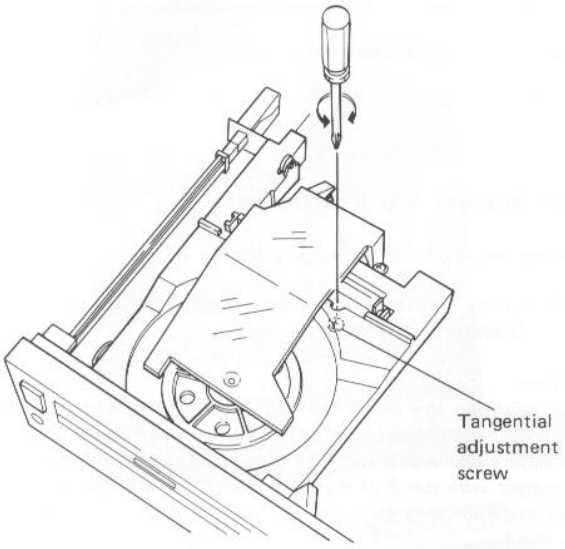
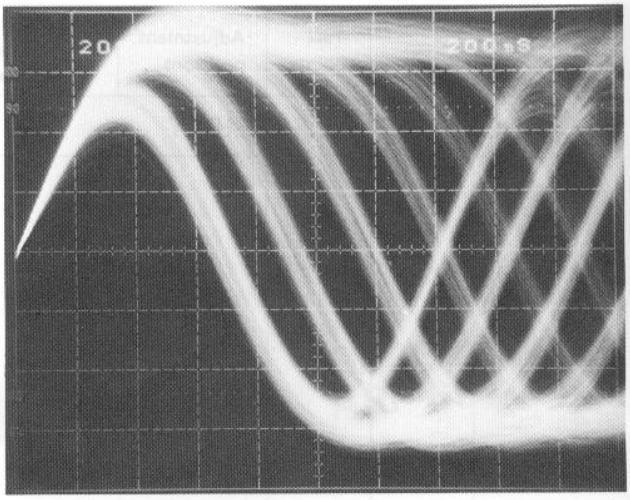
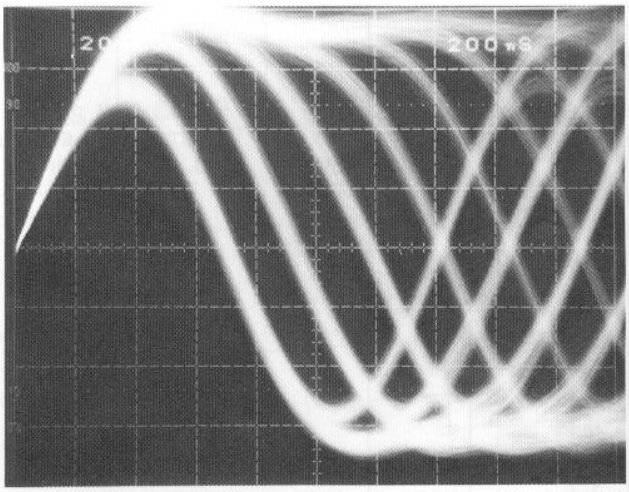


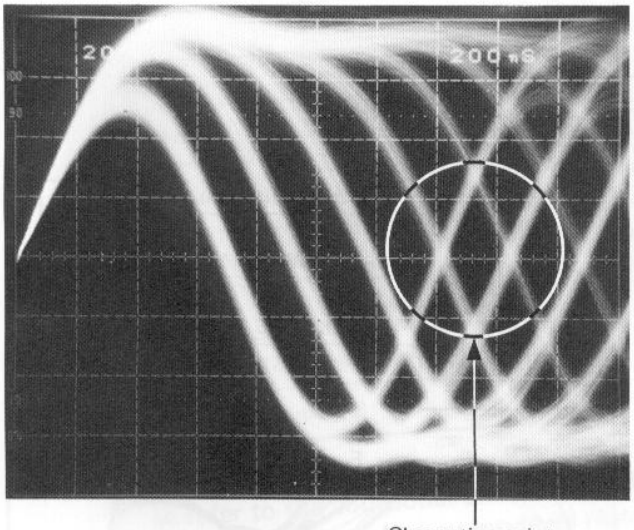
Fig. 11-5 Tangential Adjustment



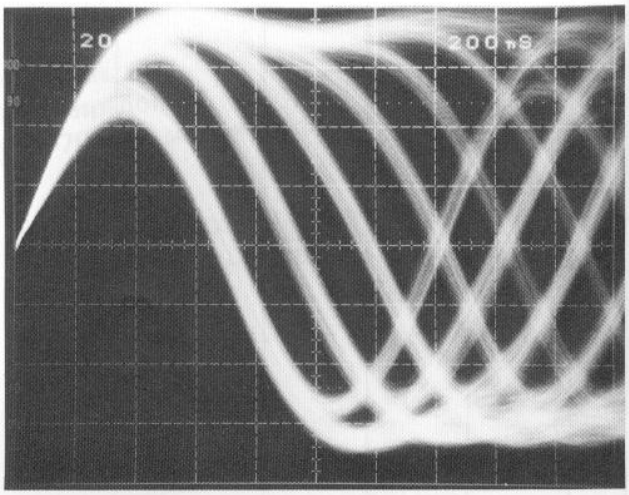
Photograph 11-9



Photograph 11-10



Photograph 11-8



Photograph 11-11

Step No.	Oscilloscope position V	Oscilloscope position H	Test points	Adjustment positions	Check items/ Adjustment specifications	Adjustment procedure
7	FOCUS GAIN ADJUSTMENT					
			TP 1 Pin 6 (FO. IN) TP 1 Pin 1 (FO. OT)	VR 3 (FO. GA)	LED (green) on	• Set the player to test mode (see page 53) • Press the STOP key (□) to switch all servos off. • Adjust the frequency and output voltage of CH1 of the F.T.G adjuster to 875Hz and 0.2Vp-p. *Note:* *If adjusting the output voltage by oscilloscope, disconnect the cable from the F.T.G adjuster circuit board, and measure and adjust with the oscilloscope probe in direct contact with pin 3 of the N1 connector (plug). (Because of the hum generated, do not measure at the tip of the cable.)* • Connect the F.T.G adjuster as shown in Figure 11-6. • Press the TRACK FWD (▷▷I), PLAY (▷), and PAUSE (▯▯) keys in that order to switch all servos on. • Adjust the compact disc player VR3 FO.GA (focus gain) control so that F.T.G adjuster Just LED (green) comes on.

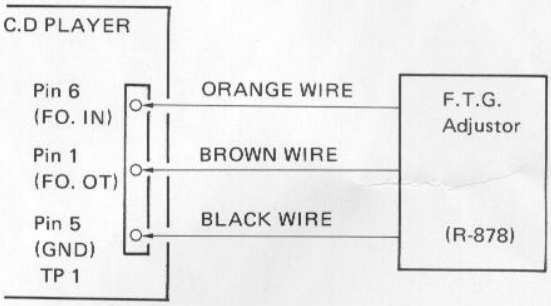
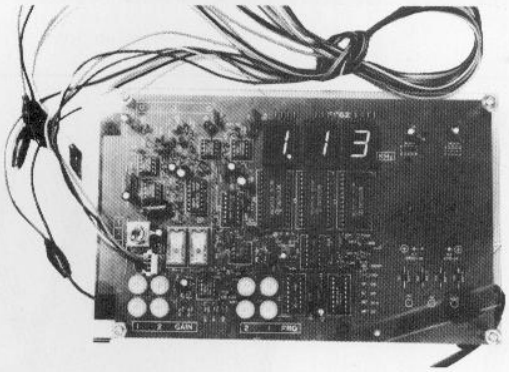


Fig. 11-6



Photograph 11-12 F.T.G adjuster

Step No.	Oscilloscope position V	Oscilloscope position H	Test points	Adjustment positions	Check items/ Adjustment specifications	Adjustment procedure
8	**TRACKING GAIN ADJUSTMENT**					
			TP 1 Pin 7 (TR. IN) TP 1 Pin 2 (TR. OT)	VR 4 (TR. GA)	LED (green) on	• Set the player to test mode (see page 53) • Press the STOP Key (□) to switch all servos off. • Adjust the frequency and output voltage of CH2 of the F.T.G adjuster to 1125Hz and 0.4Vp-p. *Note:* *If adjusting the output volage by oscilloscope, disconnect the cable from the F.T.G adjuster circuit board, and measure and adjust with the oscilloscope probe in direct contact with pin 4 of the N1 connector (plug). (Because of the hum generated, do no measure at the tip of the cable.)* • Connect the F.T.G adjuster as shown in Figure 11-7. • Press the TRACK FWD (▷▷I), PLAY (▷), and PAUSE (▯▯) keys in that order to switch all servos on. • Adjust the compact disc player VR4 TR.GA (tracking gain) control so that the F.T.G adjuster Just LED (green) comes on.

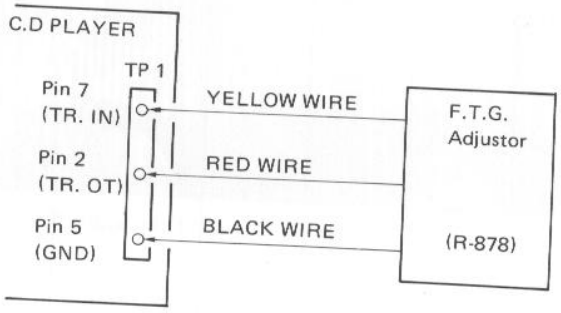


Fig. 11-7

Step No.	Oscilloscope position V	Oscilloscope position H	Test points	Adjustment positions	Check items/ Adjustment specifications	Adjustment procedure
9	**VCO FREE–RUN FREQUENCY ADJUSTMENT**					
	0.5V/div		IC 8 (2/2) Pin 8		Write the Center Value of the Waveform	• Set the player to test mode (see page 53) • Press the STOP Key (□) to switch all servos off. • Press the TRACK FWD (▷▷|) and PLAY (▷) keys in that order to close the focus and spindle servos. • Observe the waveform at pin 8 of IC8 (2/2) by oscilloscope at this time. (V: 0.5V/div.) (Although C47, R83, R87, and other circuit elements are connected to pin 8, the waveform can be easily observed if observed at the legs of C47. See Figure 11-8.) • Write the center value of the waveform at pin 8 of IC8 (2/2).
	0.5V/div		IC 8 (2/2) Pin 8	VL 1 (VCO coil)		• Using the core driver, adjust the VL1 (VCO coil) core so that the center value of the oscilloscope waveform is the same as the previously recorded value when the PAUSE key (▯▯) is pressed to switch the tracking servo on.

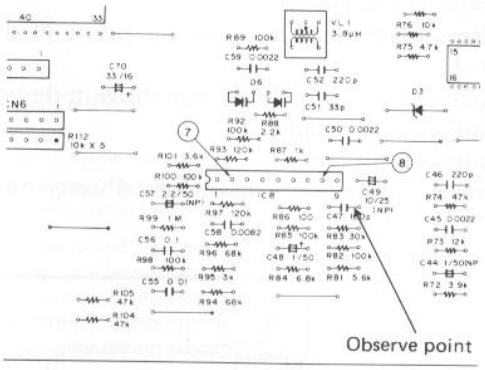


Fig. 11-8