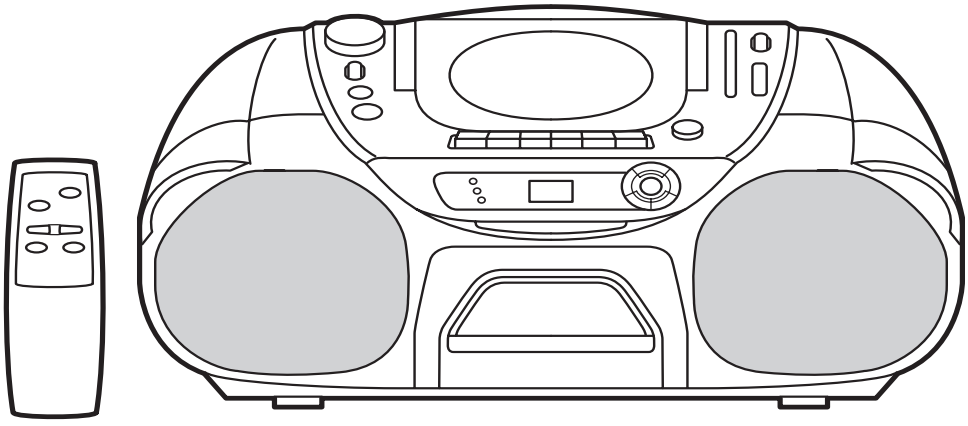
SANYO

FILE NO.

Service Manual

CD Portable
Radio Stereo Cassette Recorder

MCD-Z120 (CA)
MCD-Z120F (XE)
(AU)
(PA)
(KR)
(TW)



SPECIFICATIONS

PRODUCT CODE No.
164 049 01 MCD-Z120 (CA)
164 049 02 MCD-Z120F(XE)
164 049 03 MCD-Z120F(AU)
164 049 04 MCD-Z120F(PA)
164 049 05 MCD-Z120F(KR)
164 049 06 MCD-Z120F(TW)

(CASSETTE DECK SECTION)

Track System ..... AC bias, 4-track stereo
Erasing System ..... Magnet erase
Tape speed ..... 4.75 cm/sec.
Fast forward and
Rewind time ..... 110sec.(C60 tape)
Frequency range ..... 80 - 12,000 Hz(Normal tape)

(CD SECTION)

Channels ..... 2 channel
S/N ratio ..... 73 dB
Wow & Flutter ..... Undetectable
Sampling frequency ..... 44.1 kHz
Quantization ..... 16 bits linear/ch
Pickup light source ..... Semi-conductor laser
Pickup wave length ..... 790 nm

(RADIO SECTION)

Tuning range ..... FM : 87 - 109 MHz(CA,PA)
87.35 - 108.5 MHz(Except CA,PA)
AM : 515 - 1,740 kHz (CA,PA)
515 - 1,640 kHz (Except CA,PA)
Antenna ..... Built-in ferrite bar and Telescope rod

(GENERAL)

Output power ..... 50W (P.W.P.O)
Speaker ..... 10 cm x 2, 8 ohms
Terminal impedance ..... PHONES : 32 ohms
Power source ..... AC : 120V , 60Hz(CA)
230V , 50Hz(XE)
230-240V , 50Hz(AU)
110-120/220-240V , 50/60Hz(PA)
220V , 60Hz(KR)
110V , 60Hz(TW)
DC : 12 V (8 "D" size batteries)
Dimensions ..... 440 x 173 x 235 mm(W x H x D)
Weight (approx.) ..... 3.2 kg (without batteries)

Specifications subject to change without notice.

REFERENCE No. SM5810126

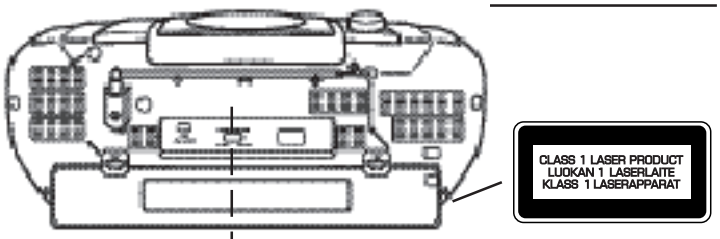
SAFETY PRECAUTION

CAUTION :

USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION EXPOSURE

LASER OUTPUT ..... 0.6 mW Max. (CW)

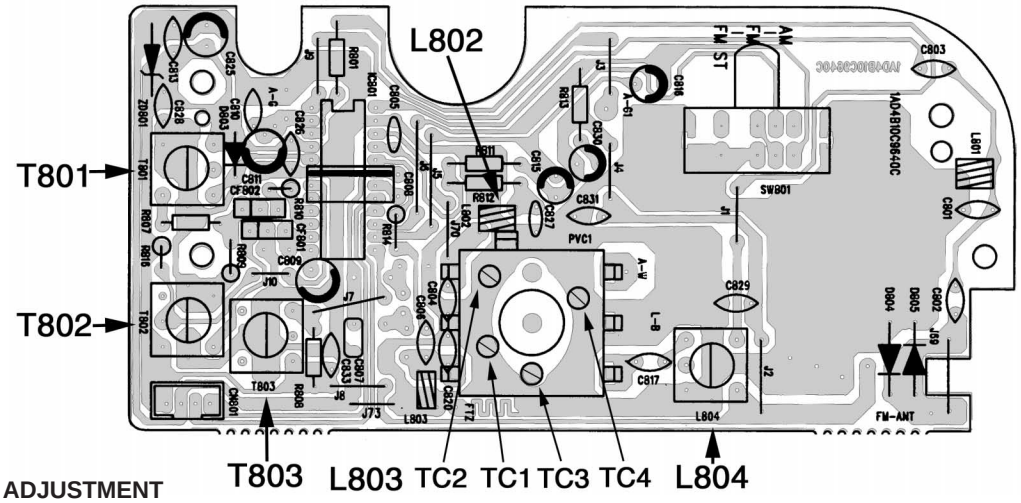
WAVELENGTH ..... 790 nm



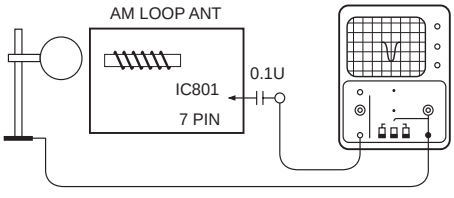
CAUTION – INVISIBLE LASER RADIATION WHEN OPEN AND INTERLOCKS DEFEATED. AVOID EXPOSURE TO BEAM.
ADVARSEL – USYNLIG LASER STRÅLING VED ÅBNING, NÅR SIKKERHEDSAFBRYDERE ER UDE AF FUNKTION, UNDGÅ UDS ÆTTELSE FOR STRÅLING.
VARNING – OSYNLIG LASER STRÅLNING NÄR DENNA DEL ÄR ÖPPNAD OCH SPÄRR ÄR URKOPPLAD. STRÅLEN ÄR FARLIG.
VORSICHT – UNSICHTBARE LASERSTRAHLUNG TRITT AUS, WENN DECKEL GEÖFFNET UND WENN SICHERHEITSVERRIEGELUNG ÜBERBRÜCKT IST. NICHT, DEM STRAHL AUSSETZEN.
VARO – AVATTAESSA JA SUOJALUKITUS OHITETTAESSA OLET ALTTIINA NÄKYMÄTTÖMÄLLE LASERSÄTEILYLLE. ÄLÄ KATSO SÄTEESEEN.

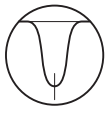
TUNER ADJUSTMENTS

PART LOCATION



(1). AM IF ADJUSTMENT



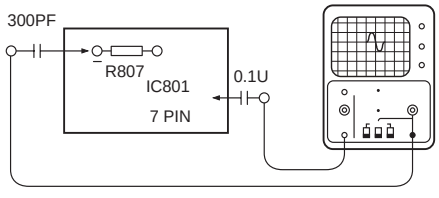


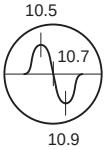
455 KHz
or
460KHz
WAVE FORM

(FIG.1)

BAND	STEP	SING. FRE.	RADIO SETTING	ADJUST-MENT	REMARKS
AM-IF	1	455KHz (CA,PA) 460KHz (Except CA,PA)		T802	ADJUST FOR BEST IF WAVE FORM

(2). FM IF ADJUSTMENT





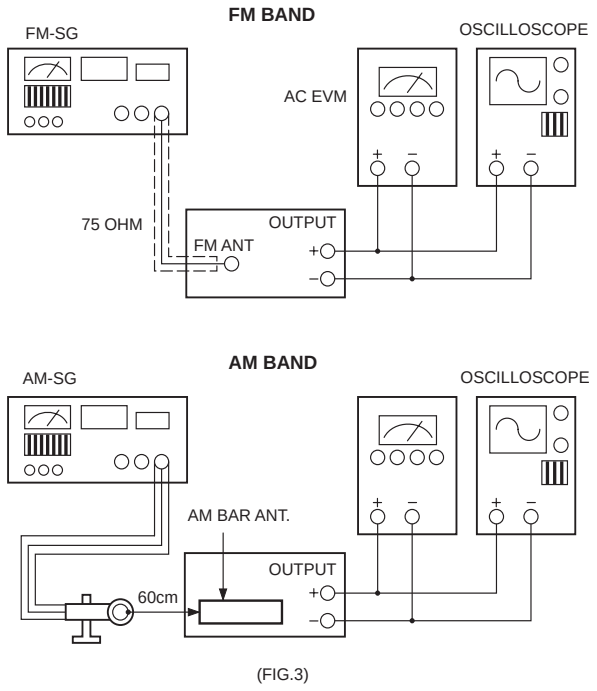
WAVE FORM
(MHZ)

(FIG.2)

BAND	STEP	SING. FRE.	RADIO SETTING	ADJUST-MENT	REMARKS
FM-IF	1	10.7MHz		T801 T803	ADJUST FOR BEST IF WAVE FORM & S CURVE

TUNER ADJUSTMENTS

(3). TUNING FREQUENCY RANGE ADJUSTMENT



(FIG.3)

FM Band: Set the internal modulation of Singnal generator to 1 KHz Dev. 22.5KHz

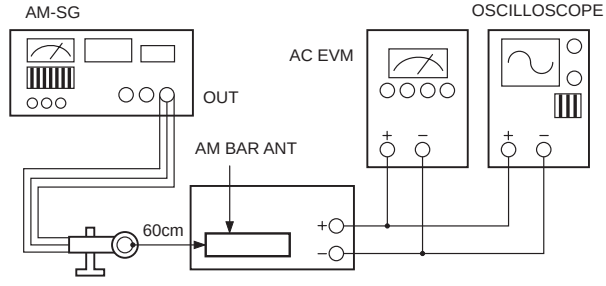
NO.	BAND	SING. FRE.	ADJUST FOR	ADJUSTMENT
1	FM	87MHz (CA,PA) 87.35MHz (Except CA,PA)	MAXIMUM SENSITIVITY	L803
2	FM	109MHz (CA,PA) 108.5MHz (Except CA,PA)	MAXIMUM SENSITIVITY	TC1 (PVC TRIMMER)
3	REPEAT STEP 1 AND 2 SEVERAL TIMES			

AM Band: Set the internal modulation of Singnal generator to 30% 1KHz

NO.	BAND	SING. FRE.	ADJUST FOR	ADJUSTMENT
4	AM	515KHz	MAXIMUM SENSITIVITY	L804
5	AM	1740KHz (CA) 1640KHz (Except CA)	MAXIMUM SENSITIVITY	TC3 (PVC TRIMMER)
6	REPEAT STEP 4 AND 5 SEVERAL TIMES			

(4). AM TRACKING ADJUSTMENT

Signal Generator ..... Connects to the AM ANT. Coil througt the loop antenna.
Adjust for the indication of VTVM of the wave form scope to be maximum.

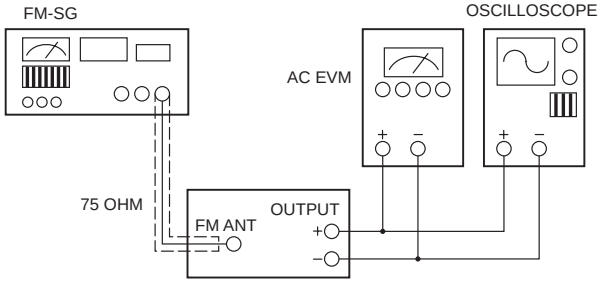


(FIG.4)

BAND	STEP	SING. FRE.	ADJUST FOR	ADJUSTMENT
AM	1	600KHz	MAXIMUM SENSITIVITY	ANT COIL
	2	1400KHz	MAXIMUM SENSITIVITY	TC4 (PVC TRIMMER)
	3	REPEAT STEP 1 AND 2 SEVERAL TIMES		

(5). FM RF TRACKING ADJUSTMENT

Signal Generator ..... Connects to the FM ANT JACK (FM IN) through the dummy.



(FIG.5)

BAND	STEP	SING. FRE.	ADJUST FOR	ADJUSTMENT
FM	1	90MHz	MAXIMUM SENSITIVITY	L802
	2	106MHz	MAXIMUM SENSITIVITY	TC2 (PVC TRIMMER)
	3	REPEAT STEP 1 AND 2 SEVERAL TIMES		

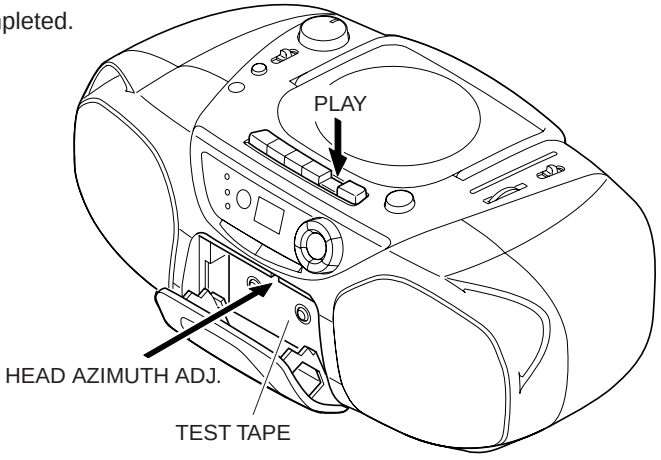
TAPE DECK ADJUSTMENTS

1. HEAD REPLACEMENT

- After replacement, demagnetize the heads by using a degausser.
- Be sure to clean the heads before attempting to make any adjustments.
- All wiring should be returned to the original position after work is completed.

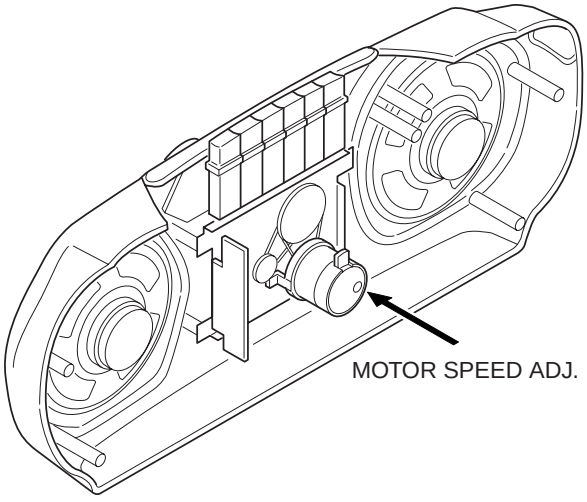
2. HEAD AZIMUTH ADJUSTMENT

(1) Load the test tape(VTT-703, etc., 10 kHz) for azimuth adjustment.
(2) Press the **PLAY** button.
(3) Use a cross-tip screwdriver to turn the screw for azimuth adjustment so that the left and right output are maximized.
(4) Press the **STOP** button.
(5) After completion of the adjustment, use thread lock(TB-1401B) to secure the azimuth-adjustment screw.



3. MOTOR SPEED ADJUSTMENT

(1) Insert the test tape(TCC-119, etc., 3,000 Hz).
(2) Press the **PLAY** button.
(3) Use a flat-tip screwdriver to turn the SVR(located inside the rear of the motor) to adjust SVR so that the frequency counter become 3,000 Hz.

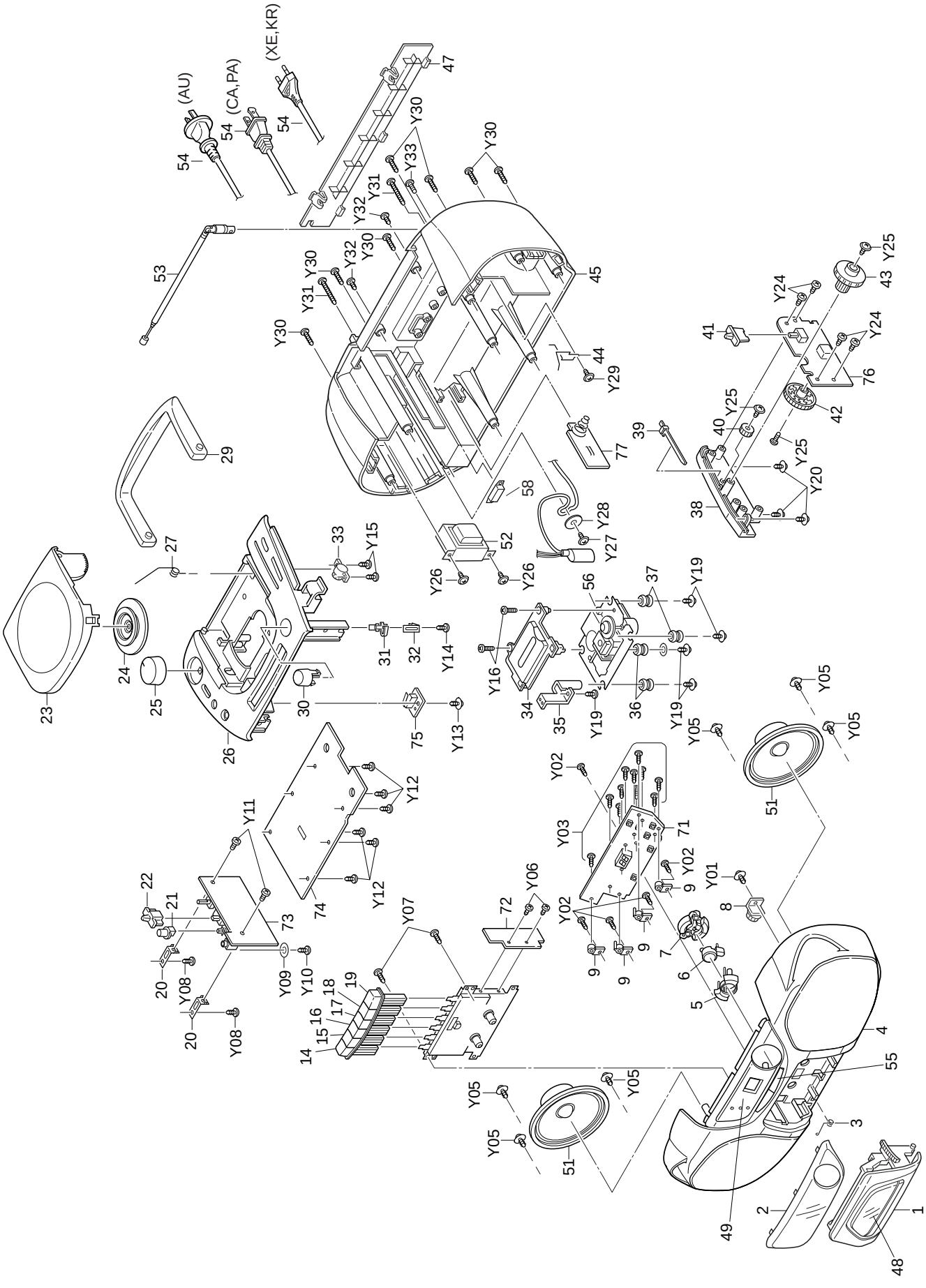


4. CHECKING THE MECHANISM TORQUES AND TENSION

- Clean the head, capstan and pinch roller before making any measurement.

Measurement	Take-up torque	Back tension
Cassette for measurement	PLAY : CT-120M FF,REW : CT-F	PLAY : CT-W
PLAY	30 - 70 gr.cm	1.0 - 6.0 gr.cm
F.FWD	55 gr.cm or more.	-----
REW	55 gr.cm or more.	-----

EXPLODED VIEW(CABINET & CHASSIS)



PARTS LIST

PRODUCT SAFETY NOTICE

EACH PRECAUTION IN THIS MANUAL SHOULD BE FOLLOWED DURING SERVICING. COMPONENTS IDENTIFIED WITH THE IEC SYMBOL ⚠ IN THE PARTS LIST AND THE SCHEMATIC DIAGRAM DESIGNATE COMPONENTS IN WHICH SAFETY CAN OF SPECIAL SIGNIFICANCE. WHEN REPLACING A COMPONENT IDENTIFIED , USE ONLY THE REPLACEMENT PARTS DESIGNATED, OR PARTS WITH THE SAME RATINGS OF RESISTANCE, WATTAGE OR VOLTAGE THAT ARE DESIGNATED IN THE PARTS LIST IN THIS MANUAL. LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS MUST BE MADE TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE PRODUCT TO THE CUSTOMER.

CAUTION : Regular type resistors and capacitors are not listed. To know those values, refer to the schematic diagram.
Regular type resistors are less than 1/4W carbon type and 0 ohm chip resistors.
Regular type capacitors are less than 50V and less than 1000μF of Ceramic type and Electrolytic type.

PACKING & ACCESSORY

REF.NO.	PART NO.	DESCRIPTION
	645 041 6989	CUSHION TOP
	645 041 6996	CUSHION BOTTOM
	645 025 4314	POLYBAG,FOR PACKING USE
	645 042 4427	CARTON CASE(CA)
	645 042 6582	CARTON CASE(XE)
	645 042 6599	CARTON CASE(AU)
	645 042 6575	CARTON CASE(PA)
	645 042 6605	CARTON CASE(KR)
	645 042 4410	INSTRUCTION MANUAL(CA)
	645 042 6544	INSTRUCTION MANUAL(XE)
	645 042 6551	INSTRUCTION MANUAL(AU)
	645 042 6537	INSTRUCTION MANUAL(PA)
	645 042 6568	INSTRUCTION MANUAL(KR)
	645 042 4236	REMOCON,Z120-HS-GY-225

CABINET & CHASSIS

REF.NO.	PART NO.	DESCRIPTION
1	645 041 6590	LID CASS
2	645 042 4328	DISPLAY LENS
3	645 041 6903	CASS DOOR SPRING
4	645 042 4182	ASSY CABINET
5	645 042 4380	CD BUTTON HOLDER
6	645 042 4359	CD BUTTON SET, PLAY/PAUSE
7	645 042 4366	CD BUTTON SET, STOP/SKIP/SEARCH
8	645 041 6354	GEAR CASS DOOR ASSY
9	645 041 6835	PCB MTG BKT
14	645 041 6804	CASS BUTTON (6),PAUSE
15	645 041 6798	CASS BUTTON (5),STOP/EJECT
16	645 041 6781	CASS BUTTON (4),FFWD
17	645 041 6774	CASS BUTTON (3),REW
18	645 041 6767	CASS BUTTON (2),PLAY
19	645 041 6750	CASS BUTTON (1),REC
20	645 041 6880	VOL PCB MTG BKT
21	645 041 6712	PUSH BUTTON,BASS XPANDER
22	645 041 6705	KNOB SLIDE,FUNCTION
23	645 041 6606	LID CD
24	645 036 2798	MAGNET HOLDER,Z90
25	645 041 6682	KNOB ROTARY,VOLUME
26	645 042 4205	ASSY CABINET TOP
27	645 041 7078	CD DOOR SPRING,Z120
29	645 042 4335	HANDLE
30	645 041 6743	CD DOOR OPEN BUTTON
31	645 041 6866	CD OPEN BUTTON HOLDE
32	645 041 6897	OPEN BUTTON BKT
33	645 041 6347	GEAR CD DOOR ASSY
34	645 025 2556	CD BRACKET 9503,CD MAIN
35	645 041 6842	CD DECK MTG BKT
36	645 037 3022	CD RUBBER CUSHION,SOFT
37	645 037 3039	CD RUBBER CUSHION,HARD
38	645 041 6828	DIAL BRACKET
39	645 041 6644	DIAL POINTER
40	645 025 2259	TUNING GEAR SMALL,Z100
41	645 041 6699	KNOB SLIDE,BAND
42	645 038 1201	VC GEAR,Z110
43	645 041 6675	KNOB ROTARY,TUNING
44	645 041 6910	ANT CONTACT SPRING
45	645 042 4199	ASSY CABINET REAR
47	645 041 2387	LID BATTERY
48	645 042 4311	CASS DOOR LENS
49	645 042 4373	DISPLAY LENS BKT,W/REMOTE HOLE
55	645 041 6811	CD BUTTON SET, REPEAT/MEMORY
56	645 036 2767	CD MECHANISM DA11,13930400 DA11

FIXING PARTS

REF.NO.	PART NO.	DESCRIPTION
Y01	645 016 5078	SCREW,CASS DOOR EJECT GEAR
Y02	645 036 2590	SCR 2.6X6,PLAY KNOB TO KEY
Y03	645 018 0613	SCREW,F PANEL TO PCB
Y05	645 016 5078	SCREW,SPK CLIP
Y06	645 026 6164	SCREW 2X4, REC SW BD TO CASS DECK
Y07	645 016 5078	SCREW,CASS DECK TO F CAB
Y08	645 025 2365	SCREW 3X8,VOL PCB TO CD BKT
Y09	645 025 2433	FIBER WASHER,HEADPHONE JACK
Y10	645 016 5078	SCREW,HEADPHONE JACK
Y11	645 036 2644	SCR 3X8,PCB BKT TO VOL PCB
Y12	645 025 2365	SCREW 3X8,MAIN PCB TO CD BKT
Y13	645 025 2365	SCREW 3X8,CD OPEN SW
Y14	645 041 6958	SCR 2.6X8,FOR CD OPEN SW L BKT
Y15	645 036 2606	SCR 2.6X8,FOR CD GEAR
Y16	645 036 2606	SCR 2.6X8,CD MECH TO CD BKT
Y19	645 034 4992	SCREW,CD MECHA
Y20	645 016 5078	SCREW,DIAL BKT TO PCB
Y24	645 025 2365	SCREW 3X8,TUNER BD TO BKT
Y25	645 016 5078	SCREW,TUN KNOB & TUN GEAR
Y26	645 016 5108	SCREW,PWR TRANS
Y27	645 016 5078	SCREW,FOR AC LINE CORD
Y28	645 025 2433	FIBER WASHER,AC LINE CORD
Y29	645 041 6958	SCR 2.6X8,FM ANT SPRING
Y30	645 036 2620	SCR 3X20,FOR REAR CAB TO F CAB
Y31	645 041 6965	SCR 3X35,REAR CAB TO F CAB
Y32	645 018 3690	SCREW,REAR CAB TO CD BKT
Y33	645 036 2644	SCR 3X8,FM ANT TO REAR CAB

PARTS LIST

ELECTRIC-PARTS

REF.NO.	PART NO.	DESCRIPTION
51	645 036 2835	4" SPK,W/SIL CAP
52	⚠ 645 037 2889	PWR TRANS, CSA APP W/APP FUSE(CA)
52	⚠ 645 039 6830	PWR TRANS, CSA APP W/APP FUSE(XE,AU)
52	⚠ 645 037 8423	PWR TRANS, CSA APP W/APP FUSE(PA)
53	645 020 3534	ROD ANTENNA
54	⚠ 645 036 2019	AC CORD,UL APP(CA)
54	⚠ 645 037 8454	AC CORD,UL APP(XE)
54	⚠ 645 022 1576	AC CORD,UL APP(AU)
54	⚠ 645 037 9468	AC CORD,UL APP(PA)
58	⚠ 645 042 6520	VOLTAGE SELECTOR(PA)
	645 026 5648	FERRITE CORE, FCC PWR TRANS SEC W
	645 026 5648	FERRITE CORE,FCC SPK WIRE
	645 026 5648	FERRITE CORE,FCC FOR CN103
	645 041 6446	3P J WIRE AWG26UL,SPK TO CN10
	645 027 8020	4P J.WIRE AWG26UL,MOTOR TO CN3
	645 041 6453	4P 3 CORE SHIELD W, R/P HEAD TO REC CN201
	645 025 1894	6P AWG28UL WIRE, CN1103 TO CD MECH
	645 041 6491	FLAT WIRE 4+350+4, CN103 TO CNP103
	645 041 6507	FLAT WIRE 4+60+4,CN101 TO CNP101
	645 041 6514	FLAT WIRE 4+60+4,CN801 TO CNP801
	645 041 6521	FLAT WIRE 4+60+4,CN102 TO CNP102
	645 041 6538	15P FILM CABLE, C1101 TO PICK UP ASSY
	645 017 0195	CABLE TIE 4",FOR PWR TRANS WIRE
	645 017 0195	CABLE TIE 4",ON/OFF WIRE
	645 017 0195	CABLE TIE 4",SPK WIRE
	645 017 0195	CABLE TIE 4",DECK TO WIRE
	645 016 5160	WIRE TIE,FOR WIRE DRESS

DISPLAY P.W.BOARD ASSY

REF.NO.	PART NO.	DESCRIPTION
71	614 312 9370	ASSY,PWB DISPLAY,CTL KEY(CA) (Only initial)
71	614 313 7221	ASSY,PWB DISPLAY,CTL KEY (Except CA)(Only initial)
CNP20	645 042 4250	5P F WIRE UL,TO CD MAIN CN20
CP104	645 041 6477	13P FLAT WIRE UL, CNP104 TO CD MAIN CN104
D0701	645 016 8956	SW DIODE
D0702	645 016 8956	SW DIODE
D0703	645 016 8956	SW DIODE
D0704	645 016 8956	SW DIODE
D0705	645 016 8956	SW DIODE
D0706	645 016 8956	SW DIODE
DP701	645 025 2044	LED DISPLAY
LD701	645 027 7856	LED SEL-2310G,PLAY
LD702	645 027 7856	LED SEL-2310G,PROG
LD703	645 027 7856	LED SEL-2310G,REPEAT
Q0701	645 016 9205	TRANSISTOR
Q0702	645 025 1634	TR 2SA1317
Q0703	645 016 9205	TRANSISTOR(Except CA)
Q0704	645 025 1634	TR 2SA1317
RX701	645 036 2170	REMOTE RECEIVER,SPS444-1
SW701	645 041 4596	TACT SW KTL-TC-0103,PLAY/PAUSE
SW702	645 041 4596	TACT SW KTL-TC-0103,PROG
SW703	645 041 4596	TACT SW KTL-TC-0103,STOP
SW704	645 041 4596	TACT SW KTL-TC-0103,F B
SW705	645 041 4596	TACT SW KTL-TC-0103,REPEAT
SW706	645 041 4596	TACT SW KTL-TC-0103,F F

REC SWITCH P.W.BOARD ASSY

REF.NO.	PART NO.	DESCRIPTION
72	614 312 9394	ASSY,PWB REC SW,AC BIAS (Only initial)
C0203	403 056 8905	POLYESTER 1000P M 50V,PRE-AMP
C0204	403 056 8905	POLYESTER 1000P M 50V,PRE-AMP
C0205	403 063 0800	POLYESTER 6800P M 50V
C0206	403 063 0800	POLYESTER 6800P M 50V
C0225	403 060 6904	POLYESTER 3300P M 50V
C0226	403 060 6904	POLYESTER 3300P M 50V
C0401	403 061 9003	POLYESTER 4700P M 50V,AC BIAS
CN201	645 017 2045	4P WAFER,R/P HEAD
CP202	645 038 0730	3P D SHIELD WIRE UL, CNP202 TO MAIN CN202
CP203	645 042 4267	12P F WIRE UL, CNP203 TO MAIN CN203
L0401	645 014 1058	BIAS/OSC,AC BIAS AHK809461
Q0401	645 025 1665	TR 2SC3330U,AC BIAS
SW201	645 014 1133	PUSH SWITCH
ZD401	645 017 1703	ZENER,AC BIAS

AMP P.W.BOARD ASSY

REF.NO.	PART NO.	DESCRIPTION
73	614 312 9356	ASSY,PWB AMP,POWER(Only initial)
	645 041 6972	HEAT SINK,FOR IC101
C0113	403 057 1905	POLYESTER 0.1U J 50V
C0114	403 057 1905	POLYESTER 0.1U J 50V
CN006	645 025 1917	4P WAFER,MOTOR
CN010	645 027 7658	3P WAFER,SPK
D0509	645 016 8956	SW DIODE,PRE-AMP
D0510	645 016 8956	SW DIODE,PRE-AMP
D0603	645 016 8956	SW DIODE
IC101	645 036 1906	IC LA4227
JACK1	645 036 4372	ST.PHONE JACK,EJS-7-1535B
L0103	645 041 6422	BEAD COIL 25UH,FCC FOR R111
L0104	645 041 6422	BEAD COIL 25UH,FCC FOR R112
Q0101	645 025 1658	TR 2SD1936-U-AC
Q0102	645 025 1658	TR 2SD1936-U-AC
SW101	645 026 5563	SWITCH EX-13G(A),BASS W/LOCK
SW501	645 020 3176	SWITCH SK43D01-G9, CD-TAPE-TUNER
VR101	645 038 0716	ROTARY VOL,XV0141

CD MAIN P.W.BOARD ASSY

REF.NO.	PART NO.	DESCRIPTION
74	614 312 9349	ASSY,PWB CD MAIN/PRE-AMP(CA) (Only initial)
74	614 313 7214	ASSY,PWB CD MAIN/PRE-AMP (Except CA)(Only initial)
	645 014 1355	EYELET,AC IN
	645 014 2246	FUSE HOLDER,FOR FUSE(Except CA)
	645 016 1971	FERRITE BAR
	645 025 2037	BAR ANTENNA HOLDER
	645 025 2396	SCREW 3X8,FOR Q501 HEAT SINK
	645 026 5716	NUT M3,FOR Q501 HEAT SINK
	645 036 2675	HEAT SINK B,9298 FOR Q501
	645 041 6309	ASSY BAR ANT,TUNER
C0056	403 061 9003	POLYESTER 4700P M 50V,AC BIAS
C0213	403 061 9003	POLYESTER 4700P M 50V
C0214	403 061 9003	POLYESTER 4700P M 50V
C0215	403 061 9003	POLYESTER 4700P M 50V
C0216	403 061 9003	POLYESTER 4700P M 50V
C0301	403 061 9003	POLYESTER 4700P M 50V(Except CA)
C0302	403 061 9003	POLYESTER 4700P M 50V(Except CA)
C0821	403 057 1202	POLYESTER 0.01U M 50V,TUNER
C0822	403 057 1202	POLYESTER 0.01U M 50V,TUNER
C1101	403 057 1905	POLYESTER 0.1U J 50V,CD MAIN
C1104	403 060 8908	POLYESTER 0.033U M 50V,CD MAIN

PARTS LIST

REF.NO.	PART NO.	DESCRIPTION
C1106	403 061 9607	POLYESTER 0.047U J 50V,CD MAIN
C1107	403 061 9607	POLYESTER 0.047U J 50V,CD MAIN
C1108	403 060 5204	POLYESTER 3300P J 50V,CD MAIN
C1109	403 057 1905	POLYESTER 0.1U J 50V,CD MAIN
C1113	403 057 1905	POLYESTER 0.1U J 50V,CD MAIN
C1114	403 057 1202	POLYESTER 0.01U M 50V,CD MAIN
C1115	403 059 0708	POLYESTER 0.018U M 50V,CD MAIN
C1116	403 060 5204	POLYESTER 3300P J 50V,CD MAIN
C1121	403 060 5204	POLYESTER 3300P J 50V,CD MAIN
C1123	403 059 4409	POLYESTER 2200P M 50V,CD MAIN
C1125	403 060 8908	POLYESTER 0.033U M 50V,CD MAIN
C1130	403 063 0800	POLYESTER 6800P M 50V,CD MAIN
C1142	403 060 5204	POLYESTER 3300P J 50V,CD MAIN
C1144	403 057 1905	POLYESTER 0.1U J 50V,CD MAIN
C1301	403 057 1905	POLYESTER 0.1U J 50V,CD MAIN
C1302	403 057 1905	POLYESTER 0.1U J 50V,CD MAIN
CN005	645 020 6771	2P WAFER,TO BATT
CN020	645 042 4274	5P WAFER,TO DISPLAY
CN104	645 027 7900	13P WAFER, CD MAIN TO DISPLAY BD
CN202	645 014 1225	3P WAFFR H-TYPE,TO REC BD
CN203	645 042 4281	12P WAFER,TO REC BD
D0501	645 016 9250	RECTIFIER
D0502	645 016 9250	RECTIFIER
D0503	645 016 9250	RECTIFIER
D0504	645 016 9250	RECTIFIER
D0505	645 016 9250	RECTIFIER,CSA APP
D0506	645 016 9250	RECTIFIER,CSA APP
D0508	645 016 9250	RECTIFIER
D0551	645 016 8956	SW DIODE
D0552	645 016 8956	SW DIODE 1N4148(Except CA)
D0601	645 016 8956	SW DIODE 1N4148(Except CA)
D1301	645 025 1689	SW DIODE GMB01-BT,CD MAIN
D1302	645 025 1689	SW DIODE GMB01-BT,CD MAIN
D1304	645 016 8956	SW DIODE,CD MAIN
FU001	645 014 1447	1.6A APP FUSEDIA5X20 250V, TIME-LAG(Except CA)
IC201	645 041 6408	IC TA7668BP
L0501	645 041 6422	BEAD COIL 25UH,FCC
L0502	645 041 6422	BEAD COIL 25UH,FCC
L0503	645 041 6422	BEAD COIL 25UH,FCC
L0504	645 041 6422	BEAD COIL 25UH,FCC
L0505	645 041 6422	BEAD COIL 25UH,FCC
L0506	645 041 6422	BEAD COIL 25UH,FCC
L0805	645 038 2307	AM COIL
L1601	645 041 6422	BEAD COIL 25UH,FCC
L1603	645 042 4243	CHOKE COIL 10UH,RADIAL TYPE
L1604	645 042 4243	CHOKE COIL 10UH,RADIAL TYPE
L1605	645 041 6422	BEAD COIL 25UH,FCC
N1101	645 036 2118	15P CONNECTOR, CD CN1101 TO PICK UP
N1103	645 017 2052	6P WAFER, CD CN1103 TO SPINDLE MOT
N1105	645 016 9342	2P WAFER,CD CN1105
Q0201	645 016 9205	TRANSISTOR
Q0501	645 036 1937	TR 2SD882
Q1101	645 025 1634	TR 2SA1317,CD MAIN
Q1301	645 025 1641	TR 2SA1346-AC,CD MAIN
Q1302	645 025 1641	TR 2SA1346-AC,CD MAIN
Q1601	645 025 1627	TR 2SB764E,CD MAIN
SW401	645 037 2896	SWITCH
U0101	645 036 1913	IC LA9250M,CD MAIN
U0201	645 025 1580	IC LA6541D,CD MAIN
U0301	645 036 4105	IC LC78602YE,CD MAIN
X1301	645 036 3573	CERAMIC RESONATOR, CSA16.93MXZ040/C
or	645 041 6552	CERAMIC RESONATOR,ZTA16.93MX
ZD501	645 025 1696	ZENER

CD SWITCH P.W.BOARD ASSY

REF.NO.	PART NO.	DESCRIPTION
75	614 311 4352	ASSY,PWB CD SWITCH(Only initial)
	645 036 2026	2P J.WIRE AWG26UL, CNP105 TO MAIN CN1105
SW001	645 025 1818	MICRO SW LF-101-0, CD DOOR SW BD

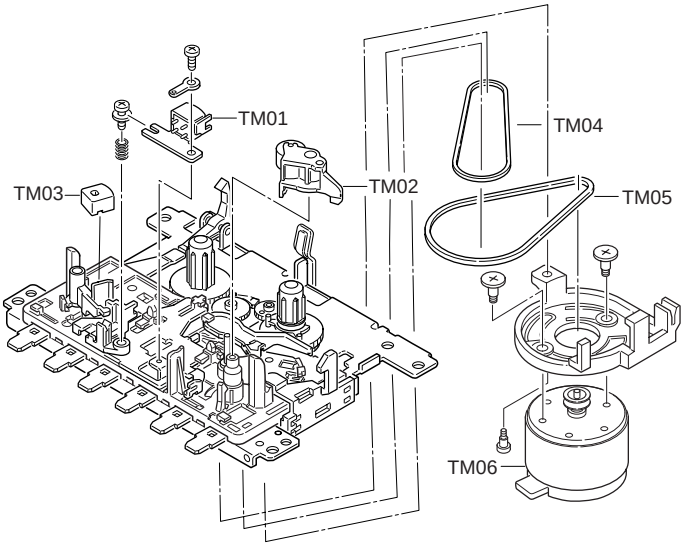
TUNER P.W.BOARD ASSY

REF.NO.	PART NO.	DESCRIPTION
76	614 311 4338	ASSY,PWB TUNER(CA)(Only initial)
76	614 313 7207	ASSY,PWB TUNER(Except CA) (Only initial)
	645 014 1966	SCREW,FOR PVC
	645 020 3503	TEST PINS,FOR AM ANT
	645 023 7935	TOOTH WASHER, FOR PVC(Except CA)
	645 026 5693	SCREW 2.6X5,FOR PVC
	645 027 3063	SCREW 2.6X6,FOR PVC(Except CA)
AFC01	645 014 0945	A F C FV-1043,AFC(Except CA)
C0807	403 056 8905	POLYESTER 1000P M 50V
C0817	645 020 3138	POLY CAP 120PF 50V
D0803	645 016 9236	SW DIODE
D0804	645 016 8956	SW DIODE
D0805	645 016 8956	SW DIODE
IC801	645 036 1890	IC LA1828
L0801	645 020 9338	FM COIL
L0802	645 014 1089	FM COIL
L0803	645 014 1072	FM COIL,FCC
L0804	645 014 1041	OSC,A-20
PVC01	645 014 0990	PVC,AM/FM
SW801	645 037 2896	SWITCH,AM-FM-FM-ST
T0801	645 025 1733	IFT,FM MIXER 0749
T0802	645 025 1757	IFT,AM IFT 0754
T0803	645 025 1740	IFT,FM DET 0750
ZD801	645 036 2804	ZENER 4.7V

BATTERY P.W.BOARD ASSY

REF.NO.	PART NO.	DESCRIPTION
77	614 292 1043	ASSY,PWB,BATT(Only initial)
	645 025 2013	BATTERY SPRING(-)

EXPLODED VIEW & PARTS LIST(TAPE MECHANISM)

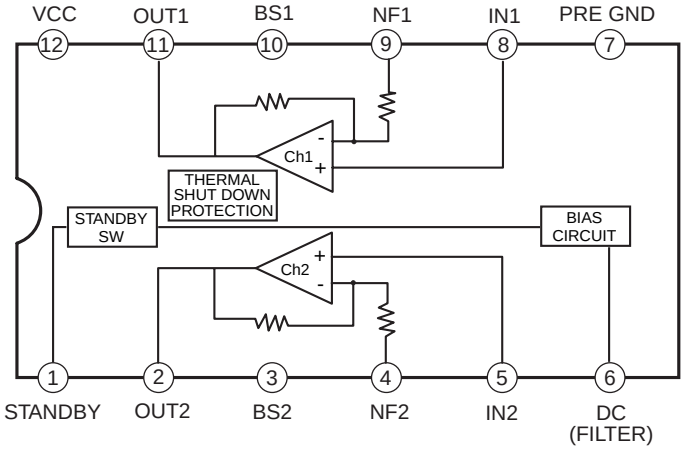


TAPE MECHANISM

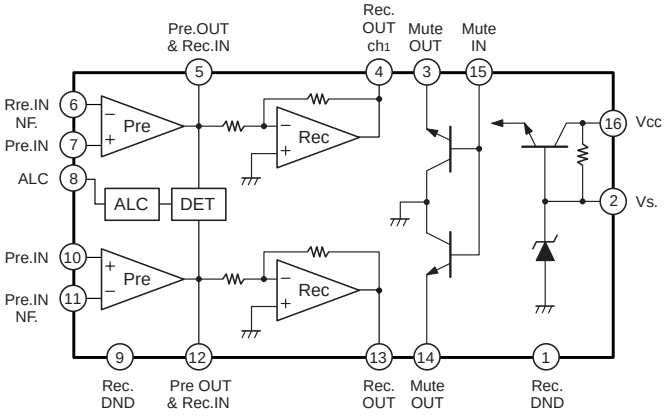
REF.NO.	PART NO.	DESCRIPTION
	645 042 4229	ASSY CASS DECK MECHA,ZY33-V 9T (Only initial)
TM01	645 016 5245	R/P HEAD TC-951,Z120/CA STEREO
TM02	645 009 1612	PINCH ROLLER ARM ASSY
TM03	645 041 7054	MG ERASE,Z120/CA
TM04	645 009 1766	RF BELT
TM05	645 033 3415	MAIN BELT
TM06	645 025 2617	ASSY,MOTOR

IC BLOCK DIAGRAM & DESCRIPTION

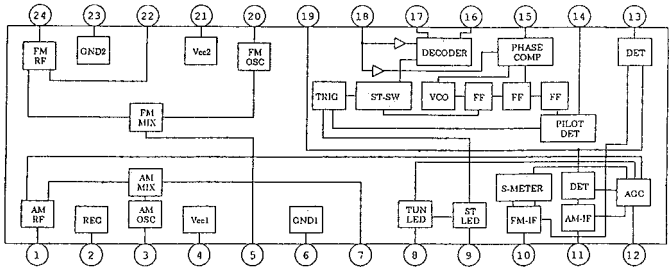
IC101 LA4227(2-channel AF power AMP)



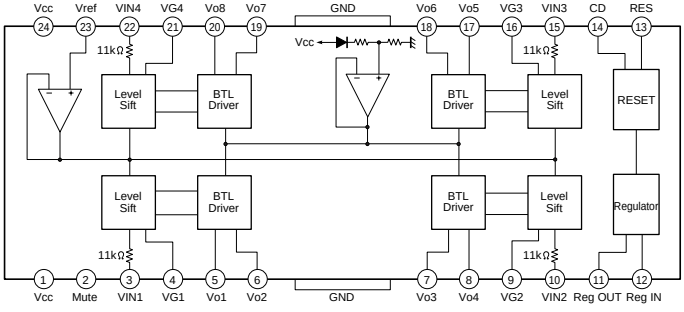
IC201 TA7668BP(Preamprifier)



IC801 LA1828(Single-chip tuner)

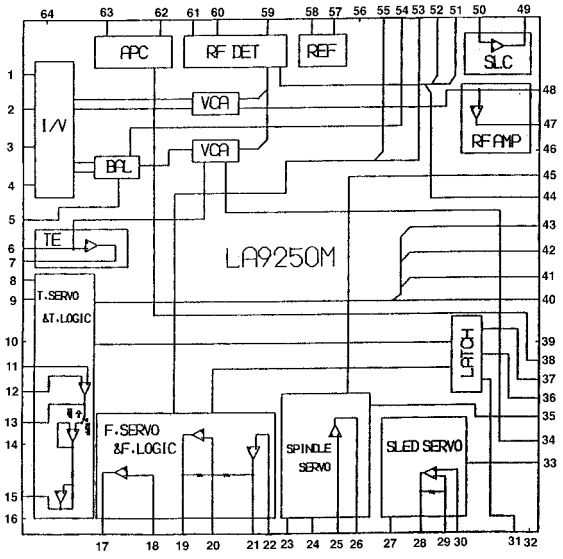


U0201 LA6541D(4-channel Bridge Driver)



IC BLOCK DIAGRAM & DESCRIPTION

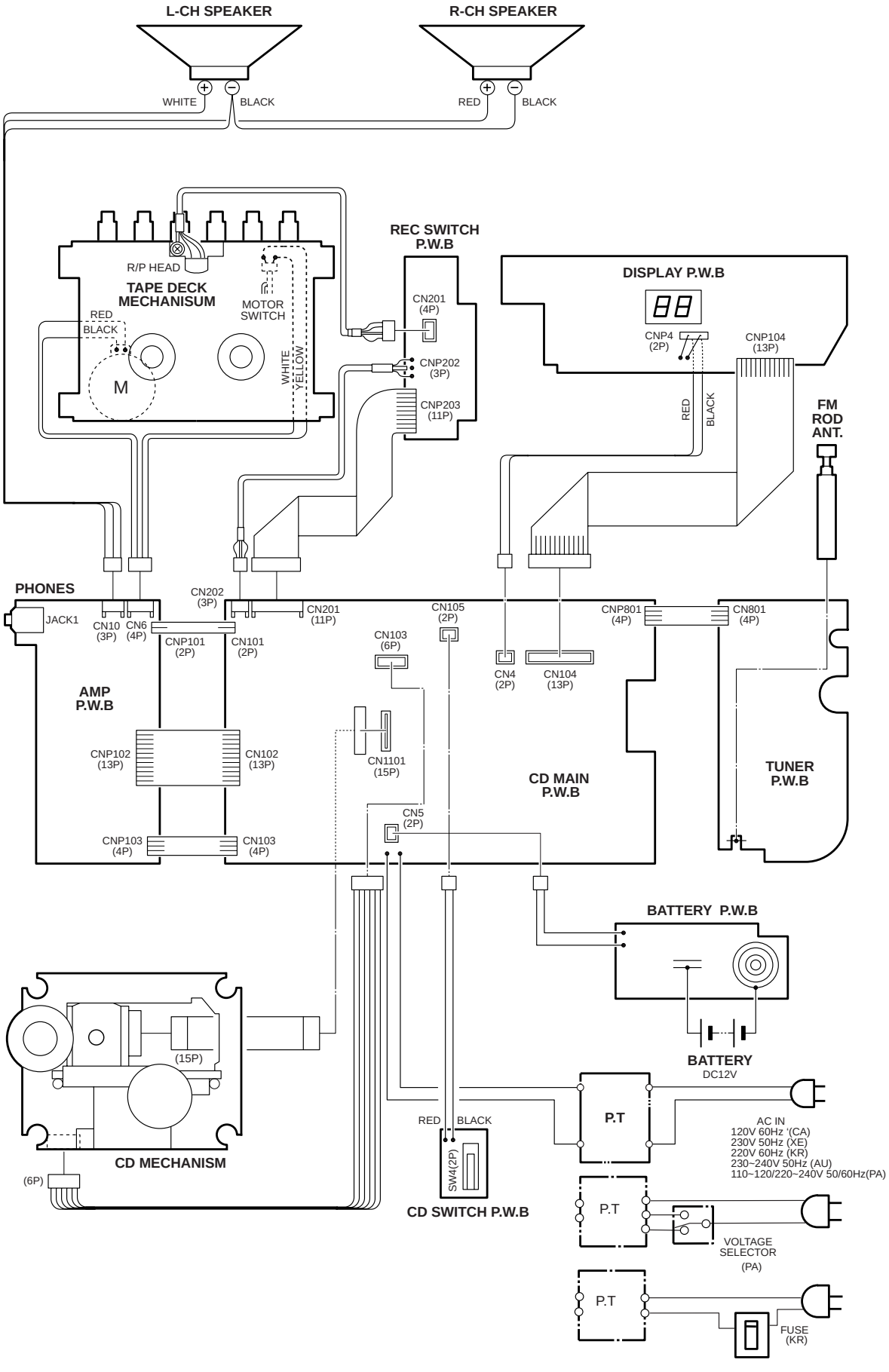
U0101 LA9250M((Analog Single Processor)



No.	Pin Name	Function
1	FTN2	Pick-up photo-diode connection pin. Added to FTN! Pin to gene RF signal, subtracted from FTN1 pin to generate the FE signal.
2	FTN1	Pick-up photo-diode connection pin.
3	E	Pick-up photo-diode connection pin. Subtracted from F pin to the TE signal.
4	F	Pick-up photo-diode connection pin.
5	TB	TE signal DC component input pin.
6	TE-	PIN which connect the TE signal gain setting resistor between and TE pin.
7	TE	TE signal output pin.
8	TSEI	TES(Track Error Sense)comparator input pin. The TE signal is thorough a band-pass filter.
9	SCI	Shock detection input pin.
10	TH	Tracking gain time constant setting pin.
11	TA	TA amplifier output pin.
12	TD-	Pin for configuring the tracking phase compensation constant the TD and VR pin.
13	TD	Tracking phase compensation setting pin.
14	JP	Tracking jump signal(kick pulse)amplitude setting pin.
15	TO	Tracking control signal output pin.
16	NC	No connection
17	FD	Focusing control signal output pin.
18	FD-	Pin for configuring the focusing phase between the FD and FA
19	FA	Pin for configuring the focusing phase compensation constant and FA- pins.
20	FA-	Pin for configuring the focusing phase compensation constant the FAS and FE pins.
21	FE	FE signal output pin.
22	FE-	Pin which connects the FE signal setting resistor between this FE pin.
23	SP	Inverted output of CLV pin signal.
24	SPG	12-cm spindle mode gain setting resistor connection pin.
25	SP-	Spindle phase compensation constant pin, along with SPD pin.
26	SPD	Spindle control signal output pin.
27	SLEQ	Sled phase compensation constant connection pin.
28	SLD	Sled control signal output pin.
29	SL-	Input pin for sled movement signal from microprocessor.
30	SL+	Input pin for sled movement signal from microprocessor.
31	OSC	Pin for setting oscillating frequency.
32	NC	No connection.

No.	PIN NAME	Function
33	SLOF	Sled servo off control input pin.
34	TGRF	Pin for setting the function on/off, which function is tracking ga following to RF level.
35	SP8	Switch control pin for spindle 8cm/12cm mode.
36	EFBAL	E/F balance control signal input.
37	FSTA	Focus search control signal input.
38	LASER	Laser on/off control input.
39	NC	No connection.
40	TJP	Input pin for tracking jump signal from DSP.
41	TGL	Input pin for tracking gain control signal from DSP. Gain is low TGL is high.
42	TOFF	Input pin for tracking off control signal from DSP. Tracking serv when TOFF is high.
43	TES	Output pin for TES signal to DSP.
44	HFL	The High Frequency Level is used to determine whether the m is positioned over a pit or over the mirrored surface.
45	CLV	Input pin for CLV error signal from DSP.
46	GND	GND
47	RF	RF output pin.
48	RF-	RF gain setting and EFM signal 3T compensation constant set along with the RF pin.
49	SLC	Slice Level Control is an output pin that control the date slice by the DSP for the RF wave-form.
50	SLI	Input pin used by DSP for controlling the date slice level.
51	DEF	Disc defect detection output pin.
52	DRF	RF level detection output(Detect RF)
53	FSC	Focus search smoothing capacitor output pin.
54	TBC	Tracking Balance Control; E/F balance adjustment variable ra setting pin.
55	FSS	Focus Search Select; focus search mode(+-search / + search reference voltage) switching pin.
56	VCC	VCC
57	REFI	By-pass capacitor connection pin for reference voltage.
58	VR	Reference voltage output pin.
59	LF2	Disc defect detection time constant setting pin.
60	PH1	RF signal peak hold capacitor connection pin.
61	BH1	RF signal bottom hold capacitor connection pin.
62	LDD	APC circuit output pin.
63	LDS	APC circuit input pin.
64	NC	No connection.

WIRING CONNECTION



VOLTAGE OF IC & TRANSISTOR

IC LA9250M

PIN NO.	DC VOLTAGE	PIN NAME
1	2.1 V	FIN2
2	2.1 V	FIN1
3	1.6 V	E
4	1.6 V	F
5	0.6 V	TB
6	2.45 V	TE−
7	2.45 V	TE
8	1.2 V	TEST
9	2.45 V	SCH
10	0.75 V	TH
11	2.0 V	TA
12	2.35 V	TD−
13	2.45 V	TD
14	2.2 V	JP
15	2.4 V	TO
16	0 V	NC
17	2.4 V	FD
18	2.45 V	FD−
19	2.45 V	FA
20	1.55 V	FA−
21	2.45 V	FE
22	2.45 V	FE−
23	0.95 V	SP
24	2.35 V	SPC
25	1.8 V	SP−
26	2.4 V	SPD
27	2.25 V	SLED
28	2.45 V	SLD
29	2.0 V	SL−
30	1.55 V	SL+
31	0.35 V	OSC
32	0 V	NC
33	4.9 V	SLOF
34	0 V	TGRF
35	0 V	SPS
36	0.4 V	EFBAL
37	0.4 V	FSTA
38	0 V	LASER
39	0 V	NC
40	1.5 V	TJP
41	4.8 V	TGL
42	4.8 V	TOFF
43	0 V	TES
44	0 V	HFL
45	1.5 V	CLV
46	0 V	DGND
47	1.6 V	RF
48	2.45 V	RF−
49	2.3 V	SLC
50	2.45 V	SLI
51	0 V	DEF
52	0 V	DRF
53	2.0 V	FSC
54	2.3 V	TBC
55	0 V	FSS
56	4.9 V	Vcc2
57	2.0 V	REFI
58	2.45 V	VR
59	0.45 V	LF2
60	0.85 V	PH1
61	0.3 V	BH1
62	4.8 V	LDD
63	0 V	LDS
64	0 V	NC

IC LC78602E

PIN NO.	DC VOLTAGE	PIN NAME
1	0 V	DEFI
2	0 V	3V / 5V
3	0 V	PDO
4	0 V	VVss
5	1.65 V	ISET
6	4.9 V	VVDD
7	0.1 V	FR
8	0 V	Vss
9	2.45 V	EFMO
10	2.3 V	EFMIN
11	0 V	TMCO
12	1.5 V	CLV
13	0 V	HFL
14	0 V	TES
15	4.8 V	TOFF
16	4.8 V	TGL
17	1.3 V	JP
18	0 V	LASER
19	0.4 V	FSTA
20	0.4 V	EFBAL
21	0 V	SPB
22	4.9 V	VDD
23	0 V	FSEQ
24	0 V	PCK
25	4.9 V	SLOF
26	0 V	SLED+
27	0 V	SLED−
28	0 V	PUIN
29	2.45 V	DOUT
30	0 V	NC
31	4.9 V	SEG 8
32	2.8 V	SEG 7
33	2.8 V	SEG 6
34	0.7 V	SEG 5
35	0.75 V	SEG 4
36	2.8 V	SEG 3
37	0.75 V	SEG 2
38	0.45 V	SEG 1
39	0 V	VSS
40	2.7 V	VDD
41	1.2 V	DIG 2
42	1.2 V	DIG 1
43	2.0 V	PROG
44	2.0 V	KEYIN
45	0 V	NC
46	0 V	NC
47	0 V	RAMDOM
48	0 V	RMTSL 3
49	0 V	EFLG
50	0 V	FSX
51	0 V	AMUTE
52	4.4 V	REMOTE
53	0 V	RMTSL 2
54	1.7 V	LCHO
55	4.2 V	L / RVDD
56	0 V	L / RVSS
57	1.7 V	RCHO
58	0 V	CLOSE
59	0 V	RMTSL 1
60	1.5 V	XOUT
61	0.35 V	XIN
62	3.8 V	XVDD
63	4.5 V	RES
64	0 V	DRF

IC LA6541D

PIN NO.	DC VOLTAGE	PIN NAME
1	8.6 V	Vcc
2	0 V	MUTE
3	2.3 V	VIN1
4	2.4 V	VG1
5	3.9 V	OUT 1+
6	4.0 V	OUT 1−
7	0 V	GND
8	0 V	GND
9	0 V	GND
10	3.9 V	OUT 2−
11	3.9 V	OUT 2+
12	2.4 V	VG2
13	2.4 V	VIN2
14	4.9 V	REG OUT
15	8 V	REG IN
16	4.9 V	RES
17	4.7 V	CD
18	2.3 V	VIN3
19	2.4 V	VG3
20	4 V	OUT 3+
21	4 V	OUT 3−
22	0 V	GND
23	0 V	GND
24	0 V	GND
25	4 V	OUT 4−
26	3.9 V	OUT 4+
27	2.4 V	VG4
28	2.3 V	VIN4
29	2.4 V	Vref
30	8.6 V	Vcc

IC TA7668

PIN NO.	DC VOLTAGE
1	0 V
2	7.9 V
3	0 V
4	3.1 V
5	1.3 V
6	1.2 V
7	0.1 V
8	0 V
9	0 V
10	0 V
11	1.3 V
12	1.3 V
13	3.1 V
14	0 V
15	0.9 V
16	8.0 V

IC LA1828

PIN NO.	DC VOLTAGE		PIN NAME
	FM	AM	
1	1.25 V	1.25 V	AM RF INPUT
2	1.25 V	1.25 V	REG
3	3.4 V	3.9 V	AM OSC
4	3.7 V	3.9 V	VCC 1
5	3.7 V	3.9 V	FM MIN
6	0 V	0 V	GND 1
7	3.7 V	3.9 V	AM MIX
8	0 V	0 V	TUN LED
9	0 V	0 V	ST LED
10	1.25 V	1.2 V	FM IF INPUT
11	1.2 V	1.2 V	AM IF INPUT
12	0.05 V	0.3 V	AGC
13	3.7 V	3.9 V	FM DET
14	0 V	2.3 V	PILOT DET
15	3.0 V	0 V	PHASE COMP
16	1.0 V	1.0 V	L ch OUTPUT
17	1.0 V	1.0 V	R ch OUTPUT
18	0.6 V	0.6 V	MPX INPUT
19	1.2 V	0.15 V	AM / FM IF OUTPUT
20	0.85 V	3.7 V	FM OSC
21	0.9 V	3.9 V	VCC 2
22	0.9 V	3.9 V	FM RF OUTPUT
23	0 V	0 V	GND 2
24	0.8 V	0 V	FM ANT INPUT

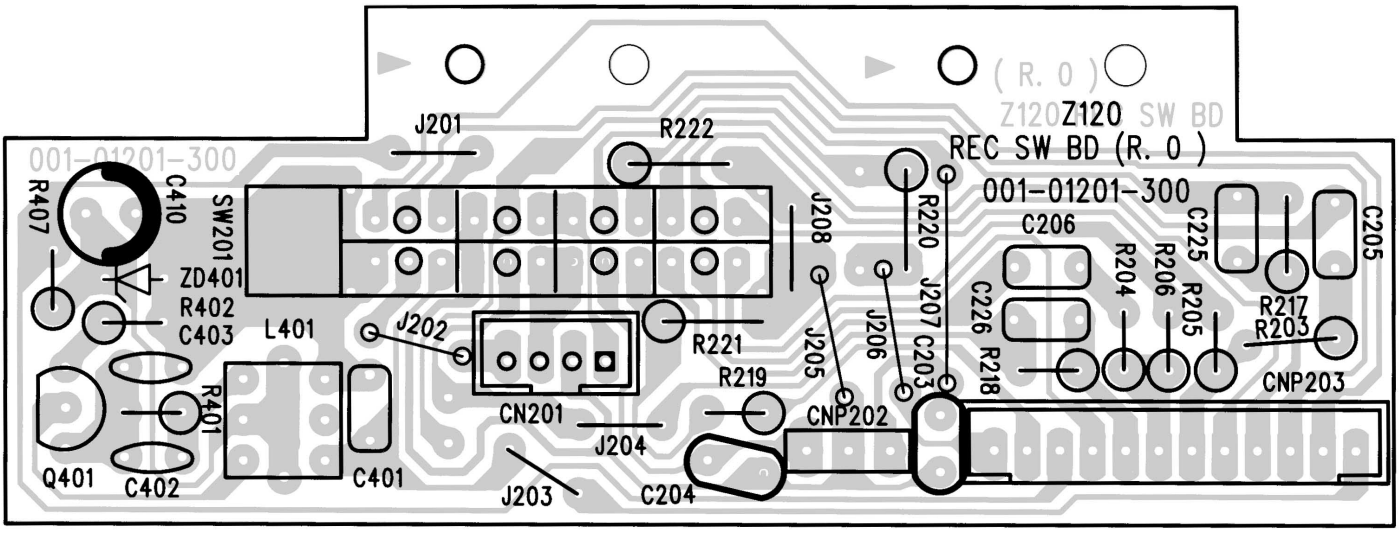
IC LA4227

PIN NO.	DC VOLTAGE	PIN NAME	PIN NO.	DC VOLTAGE	PIN NAME
1	11.0 V	Vcc2	7	0 V	GND
2	5.7 V	OUT−1	8	0 V	IN 2
3	10.5 V	B.S.1	9	1.2 V	NF 2
4	1.2 V	NF 1	10	10.5 V	B.S.2
5	0 V	IN 1	11	5.7 V	OUT−2
6	11.0 V	RIPPLE	12	12.0 V	Vcc1

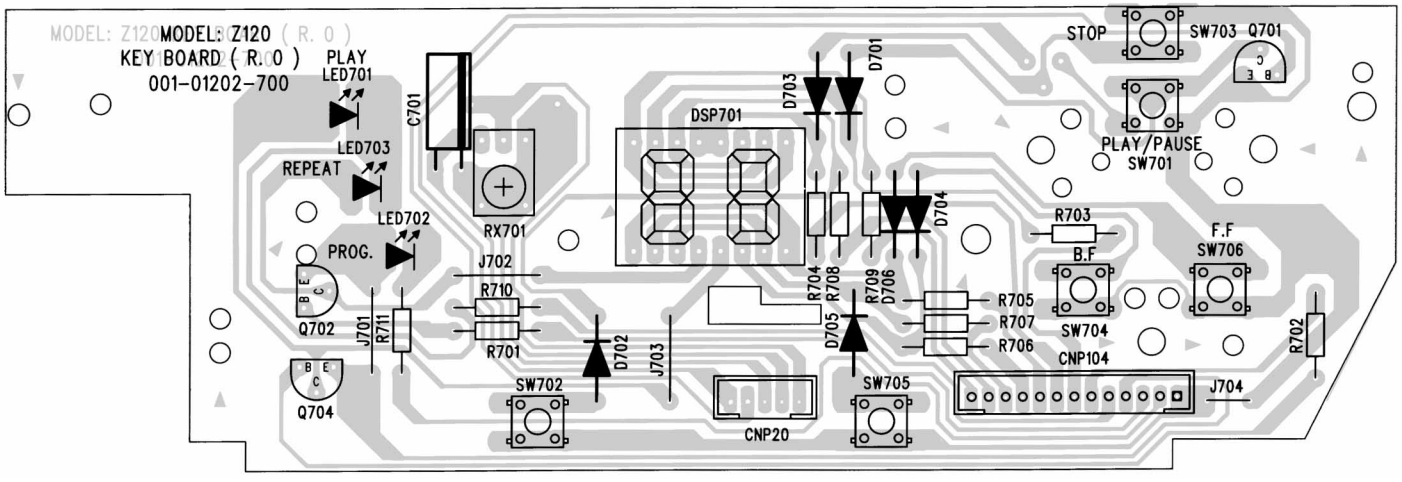
TRANSISTOR VOLTAGE TABLE

PATRS NO.	B	C	E
Q 201	0.7 V	0 V	0 V
Q 101	0.65 V	0 V	0 V
Q 102	0.65 V	0 V	0 V
Q 501	9.3 V	11.5 V	8.7 V
Q 701	0 V	0 V	3.95 V
Q 1101	4.8 V	0 V	4.9 V
Q 1301	1.0 V	0.45 V	4.9 V
Q 1302	0.55 V	4.9 V	4.9 V
A 1601	8.0 V	4.9 V	8.7 V
Q 702	2.0 V	1.1 V	2.7 V
Q 704	2.0 V	1.1 V	2.7 V

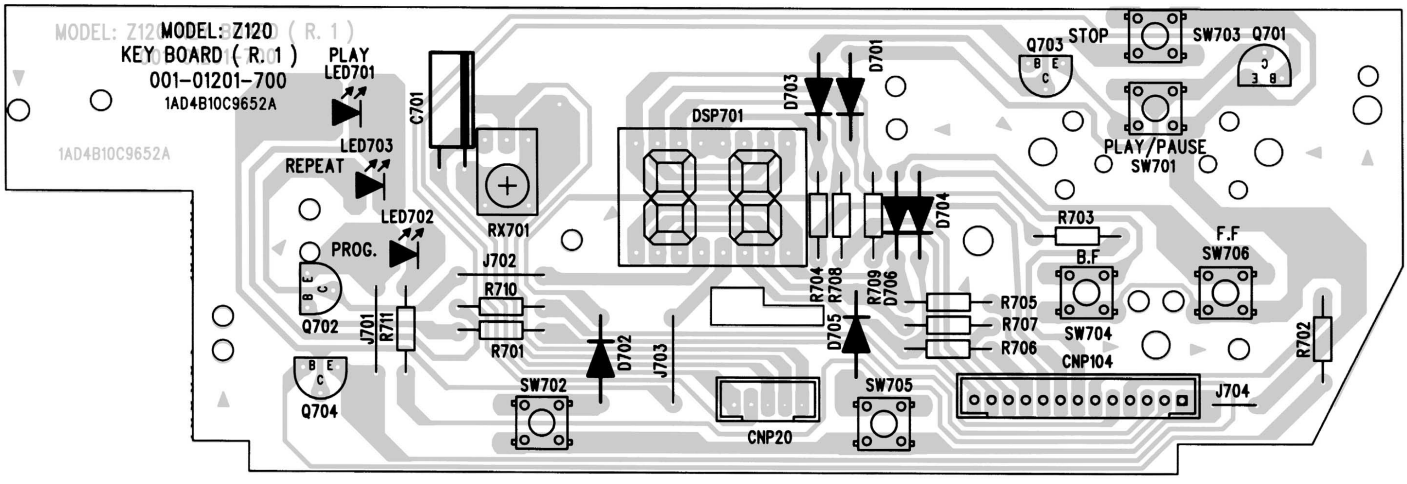
WIRING DIAGRAM (REC SWITCH, DISPLAY)



REC SWITCH

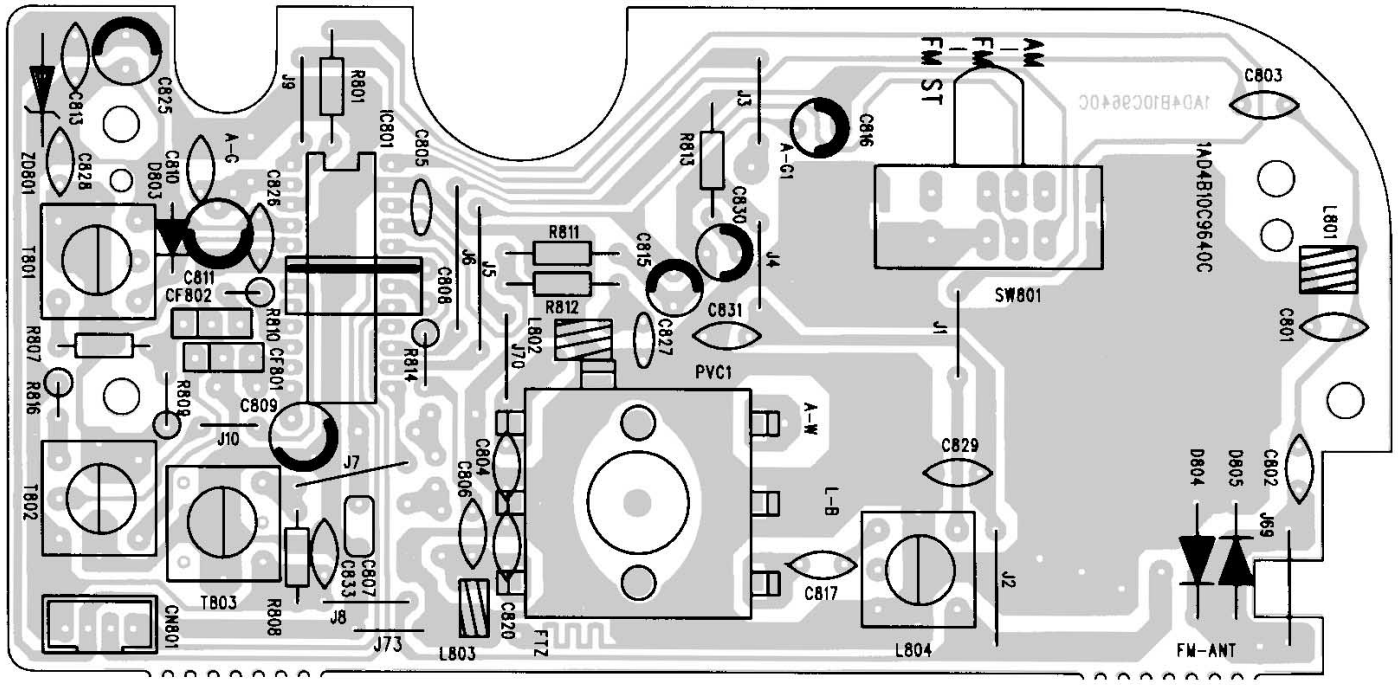


DISPLAY(CA)

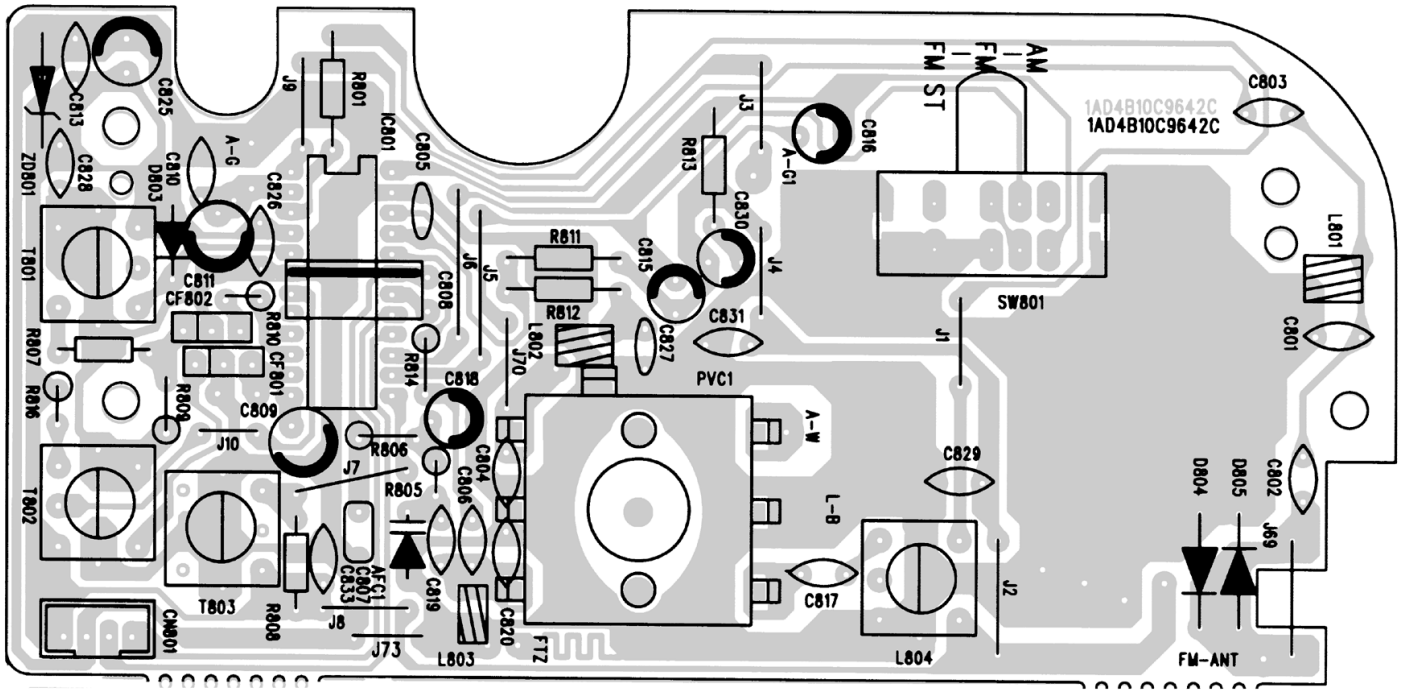


DISPLAY(Except CA)

WIRING DIAGRAM (TUNER)

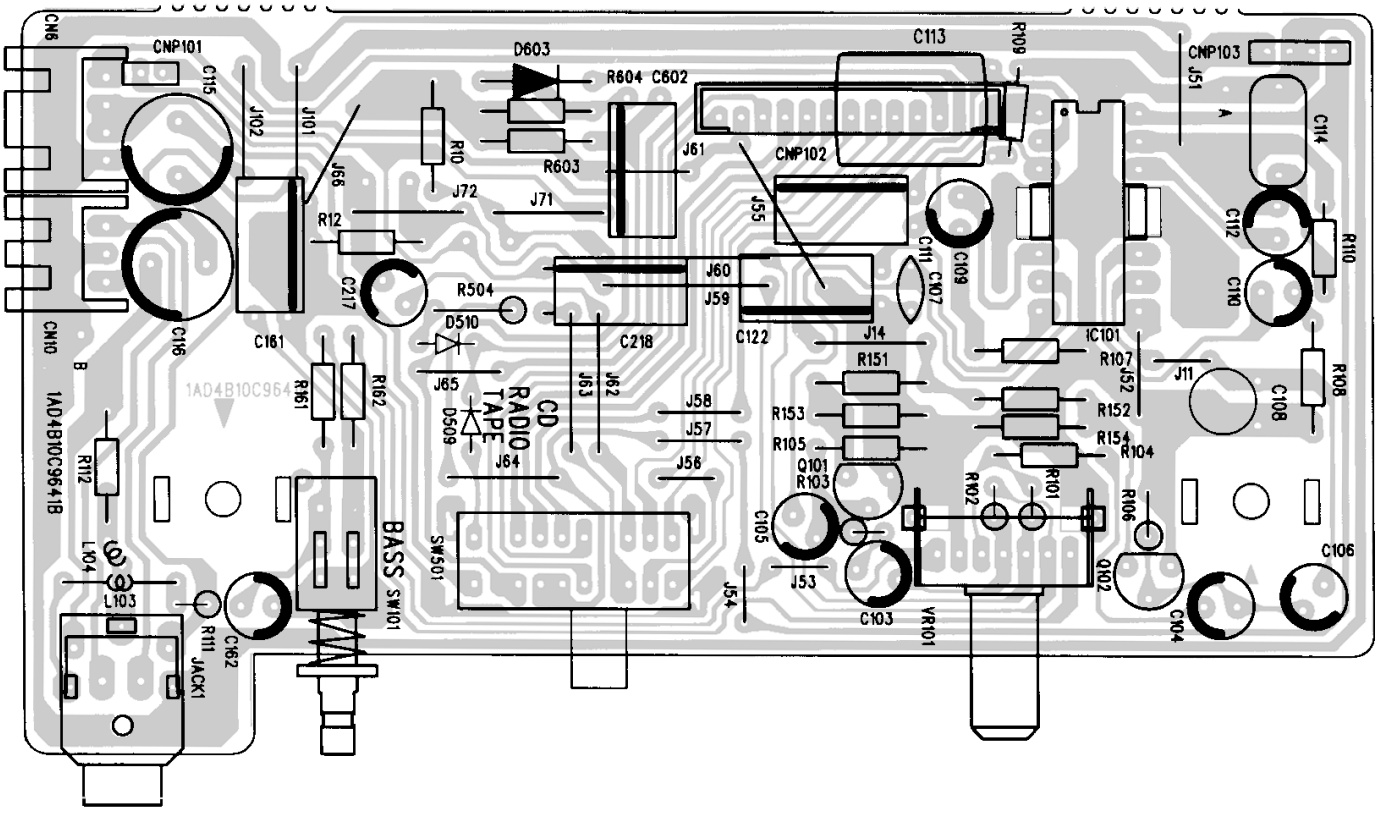


TUNER(CA)

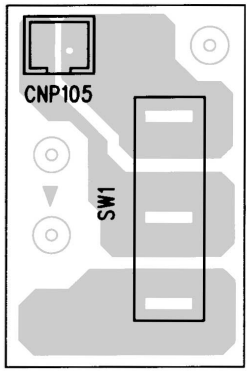


TUNER(Except CA)

WIRING DIAGRAM (POWER AMP, CD SWITCH)



POWER AMP



CD SWITC H

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Osaka, Japan

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1. SPECIFICATIONS

1-1 Unit Specifications

MODEL NO.	Indoor Unit			SPW-T252GH5	
	Outdoor Unit			SPW-C252GH8	
POWER SOURCE				380 / 400 / 415 V – 3 ø – 50 Hz	
PERFORMANCE				Cooling	Heating
Capacity			BTU / h kW	25,000 7.33	27,000 7.91
Air circulation (Hi/Me/Lo)			m^3 / h	1,140 / 1,020 / 840	
Moisture removal (High)			Liters / h	4.2	—
ELECTRICAL RATINGS					
Voltage rating			V	380 / 400 / 415	
Available voltage range			V	342 – 456	
Running amperes			A	4.7 / 4.7 / 4.5	4.7 / 4.5 / 4.3
Power input			W	2,740 / 2,770 / 2,790	2,630 / 2,660 / 2,670
Power factor			%	86 / 86 / 87	85 / 85 / 86
E.E.R			BTU / Wh	9.15 / 9.02 / 8.90	—
Starting amperes			A	27 / 29 / 30	
FEATURES					
Controls / Temperature control				Microprocessor / I.C. thermostat	
Timer				ON / OFF 24-hours & Program	
Fan speeds Indoor / Outdoor				3 and Automatic control	
Airflow direction (Indoor)				Automatic (Remote control)	
Air filter				Washable, easy access	
Compressor				Rotary	
Refrigerant / Amount charged at shipment			g	R22 / 3,700	
Refrigerant control				Elec. Refrigerant Control Valve	
Operation sound	Indoor – Hi/Me/Lo		dB-A	45 / 41 / 37	
	Outdoor – Hi		dB-A	52	
Refrigerant tubing connections				Flare type	
Max. allowable tubing length at shipment			m(ft)	Max. 50 (164)	
Limit of tubing length			m(ft)	50 (164)	
Refrigerant tube diameter	Narrow tube		mm(in)	6.35 (1/4)	
	Wide tube		mm(in)	15.88 (5/8)	
Refrigerant tubing kit / Accessories				Optional / Mounting plates	
DIMENSIONS & WEIGHT				Indoor Unit	Outdoor Unit
Unit dimensions	Height		mm(in)	185 (7- 1/ 4)	885 (34- 7/ 8)
	Width		mm(in)	1,270 (50)	870 (34- 1/ 4)
	Depth		mm(in)	670 (26- 3/ 8)	300 (11- 3/ 4)
Net weight			kg(lb)	28 (61)	72 (158)
Shipping weight			kg(lb)	36 (79)	86 (190)
Shipping volume			$m^3(ft^3)$	0.29 (10.3)	0.35 (12.5)

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

Rated conditions

Cooling: Indoor air temperature 27°C DB/19.5°C WB, Outdoor air temperature 35°C DB

Heating: Indoor air temperature 21°C DB, Outdoor air temperature 7°C DB/6°C WB

1-2 Major Component Specifications

(A) Indoor Unit

MODEL No.			SPW-T252GH5
Source			220 / 230 / 240 V – 1 ø – 50Hz
Remote control unit			RCS-X252GH (Microprocessor)
Controller P.C.B. Ass'y			POW-X252GH (Microprocessor)
Fan (Number...diameter)		mm	Centrifugal (4...ø130)
Fan Motor			
Model...Nominal output		W	KFG4Q - 41A5P...40 W
Source			220 / 230 / 240 V – 1 ø – 50Hz
No. of pole...rpm (230V, High)		rpm	4...1,198
Coil resistance (Ambient temperature 20°C)		Ω	BRN – WHT : 175.1 ORG – YEL : 70.9 WHT – VLT : 43.6 YEL – PNK : 15.6 VLT – ORG : 27.0
Safety devices			
Operating temperature	Open	°C	130 ± 8 °C
	Close	°C	79 ± 15 °C
Run capacitor		VAC, μF	440 V, 2.5μF
Electronic Refrigerant Control Valve			
Solenoid control model...Rated			DKV-MOZS076B0...12 V, 6.3 W
Coil resistance (at 20°C)		Ω	ORG – GRY : 46, YEL – GRY : 46 RED – GRY : 46, BLK – GRY : 46
Solenoid control valve model			DKV-2471
Heat exchanger			
Coil			Aluminum plate fin, Copper tube
Rows...fin pitch		mm	3...2.0
Face area		m^2	0.186
Auto louver motor			MC8 D
Rated		V, Hz, W, rpm	200 – 240 VAC, 50 Hz, 3 W, 3.3 rpm, 8 P
Coil resistance (at 25 °C)		Ω	14,900 Ω ± 8%
Dew proof heater		V, W	240 V, 15 W

(B) Outdoor Unit

Unit Model No.			SPW-C252GH8
Source			380 / 400 /415 V – 3 ø – 50 Hz
Controller P.C.B. Ass'y			POW-30CH (Microprocessor)
Control circuit fuse			250 V, 5 A
Compressor			Rotary (Hermetic)
Model...Code No.			C-R224H8U...806 577 88
Nominal output		W	2,400
Compressor oil		cc	1,350
Coil resistance (at 25°C)		Ω	T-R: 5.54, R-S: 5.54, S-T: 5.54
Crank case heater		V, W	240 V, 25 W
Refrigerant amount at shipment		g	R 22/ 3,700
Safety devices			
Overload relay models			Internal type
Operating temperature	Open °C		120 ± 5
	Close °C		98 ± 11
High pressure switch			ACB-JB22
Set pressure	OFF kg/cm²		30 $^{+2.0}_{-0.5}$
	ON kg/cm²		24 ± 2.0
Fan			
Number...diameter		mm	Propeller (1...ø460)
Fan motor			
Model...Nominal output (W)			SFC6T-71B5P...70 W
No. of pole...rpm (230 V, High)			6...778 rpm
Coil resistance (Ambient temperature 20°C)		Ω	BRN – WHT : 80.4, VLT – YEL : 10.52 WHT – VLT : 27.4, YEL – PNK : 6.30
Safety device			
Operating temperature	Open °C		130 ± 8
	Close °C		79 ± 15
Run capacitor		VAC, µF	440V, 5 µF
Heat exchanger			
Coil			Aluminum plate fin / Copper tube
Rows...fin pitch		mm	2...2.0
Face area		m²	0.616

1-3 Other Component Specifications

		Indoor Unit	Outdoor Unit
Power Transformar		ATR-III265Q	ATR-II125
Rated			
Primary	V, Hz	AC 230 V, 50Hz	AC 230, 50Hz
Secondary		11.2 ± 0.3 V 2.0 A	10 V 1.0 A
		13.5 ± 0.3 V 0.95 A	10 V 0.2 A
		10.8 ± 0.3 V 0.32 A	—
Coil resistance	Ω	WHT – WHT: 44.8, BRN – BRN : 1.28 RED – RED: 0.28, YEL – YEL : 1.44	WHT – WHT: 167, BRN – BRN: 4.1
Thermal cut off temperature	°C	145	145
Thermistor (Coil sensor)		PBC-41E-S14, PBC-41E-S4	
Coil resistance	Ω	–20°C: 40.1 ± 5% 10°C: 9.9 ± 5% –10°C: 24.4 ± 5% 20°C: 6.5 ± 5% –5°C: 19.3 ± 5% 30°C: 4.4 ± 5% 0°C: 15.5 ± 5% 40°C: 3.0 ± 5% 5°C: 12.2 ± 5% 45°C: 2.5 ± 5%	
Thermistor (Room or coil sensor)		SDT-500B6-2	PTC-51H-SI
Coil resistance	Ω	0°C: 16.3 ± 5% 40°C: 2.6 ± 5% 5°C: 12.5 ± 5% 45°C: 2.1 ± 5% 10°C: 9.9 ± 5% 50°C: 1.8 ± 5% 20°C: 6.3 ± 5% 55°C: 1.5 ± 5% 30°C: 4.0 ± 5%	60 °C: 13.8 ± 5% 90°C: 5.1 ± 5% 70 °C: 9.7 ± 5% 100°C: 3.8 ± 5% 75 °C: 8.2 ± 5% 110°C: 2.8 ± 5% 80 °C: 7.0 ± 5% 120°C: 2.2 ± 5% 85 °C: 5.9 ± 5% 130°C: 1.7 ± 5%
Relay		—	FMCA-1S / MY2F-T1
Coil rated	V	—	AC 220 – 240 V / DC 12 V
Contact rating	V, A	—	AC 440 V, 13A / AC 240 V, 5A
Coil resistance (at 25 °C)	Ω	—	— / 160 ± 15 %
Solenoid control valve or coil			
Solenoid control valve		DKV - 2471	—
Solenoid coil		DKV - MOZS076B0	LB60012

1

1-4 Dimensional Data

(A) Indoor Unit : SPW-T252GH5

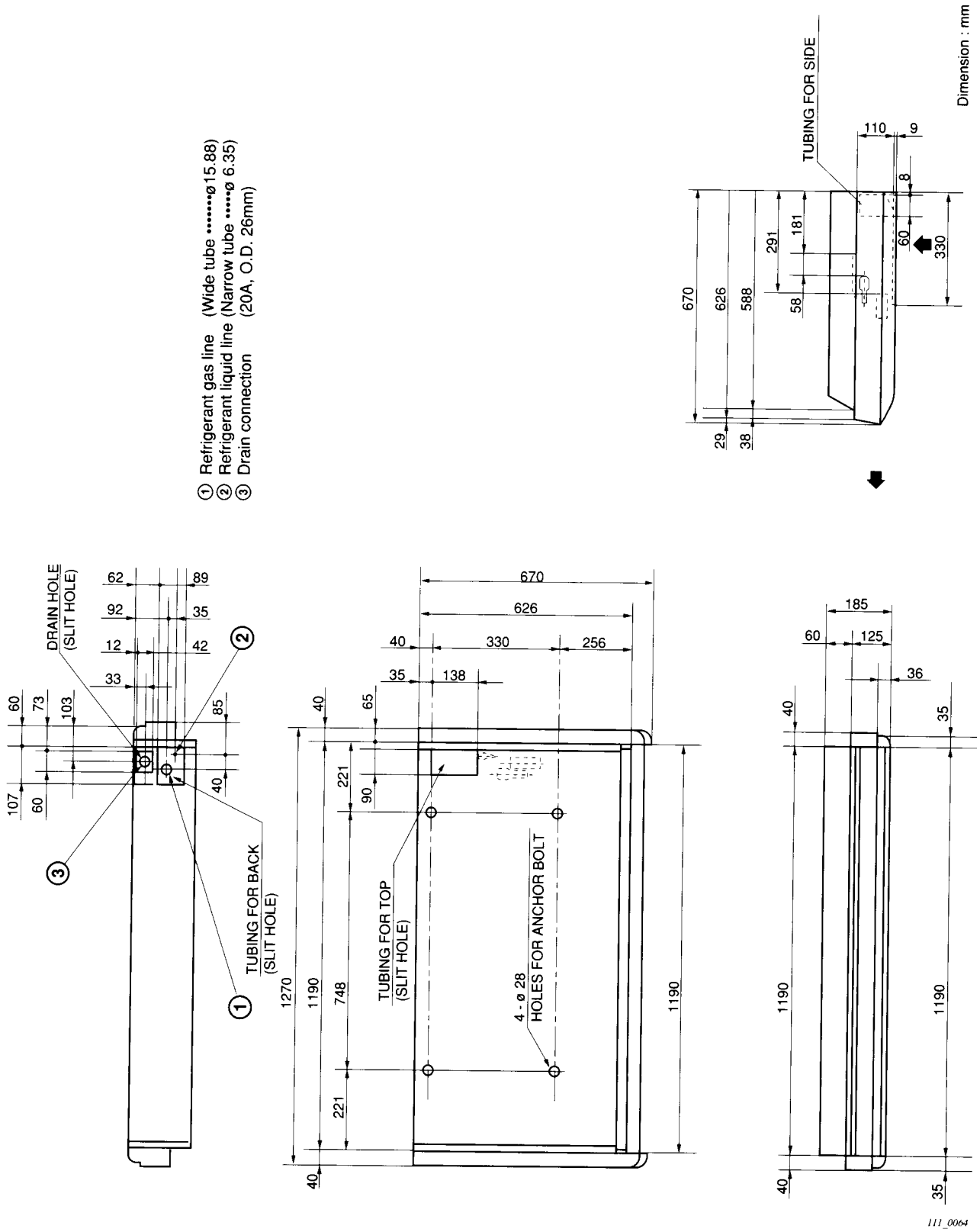
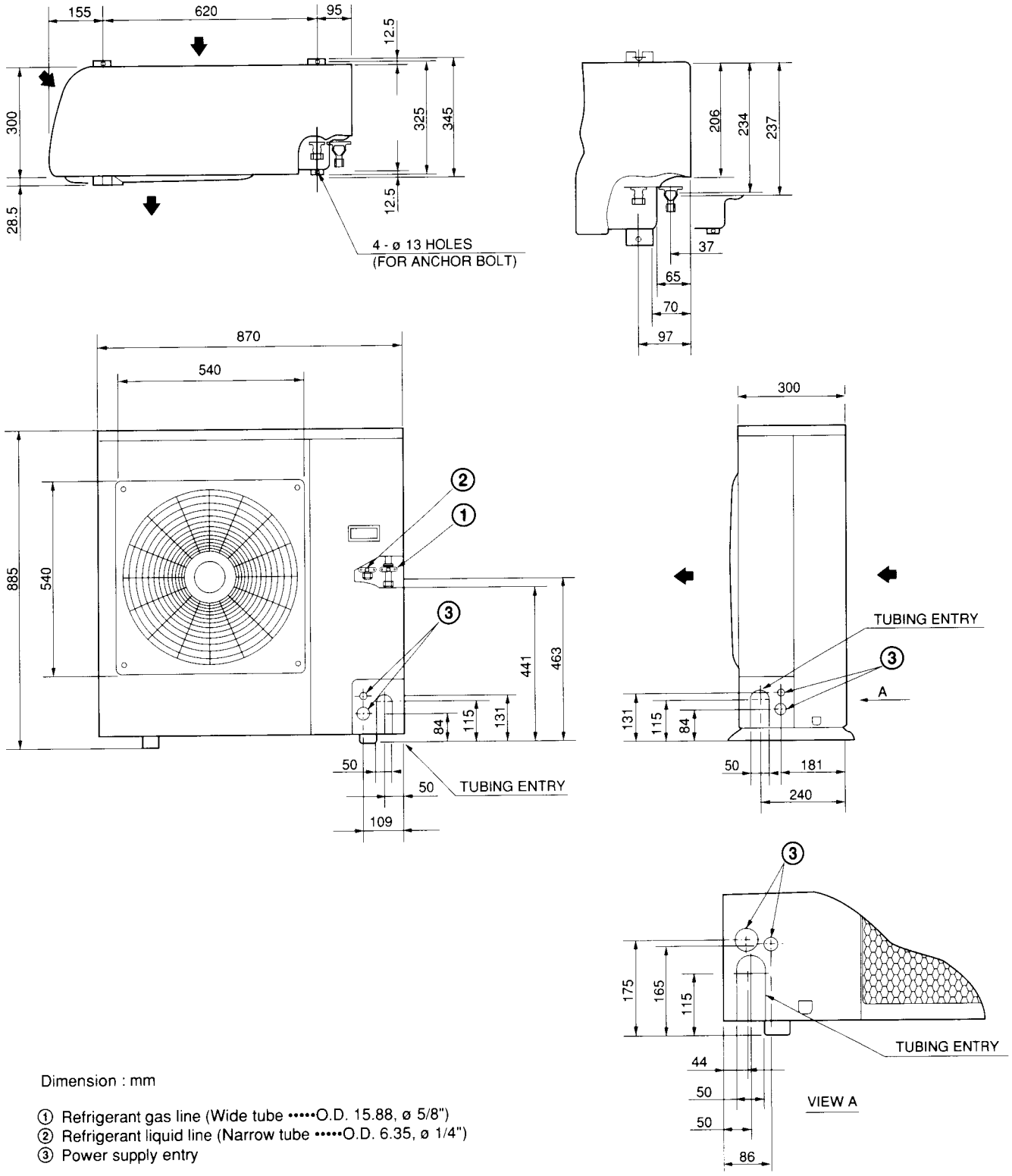


Fig. 1

(B) Outdoor Unit : SPW-C252GH8



Dimension : mm

① Refrigerant gas line (Wide tube •••••O.D. 15.88, ø 5/8")
② Refrigerant liquid line (Narrow tube •••••O.D. 6.35, ø 1/4")
③ Power supply entry

Fig. 2

1-5 Refrigerant Flow Diagram

Outdoor Unit : SPW-C252GH8 **Indoor Unit : SPW-T252GH5**

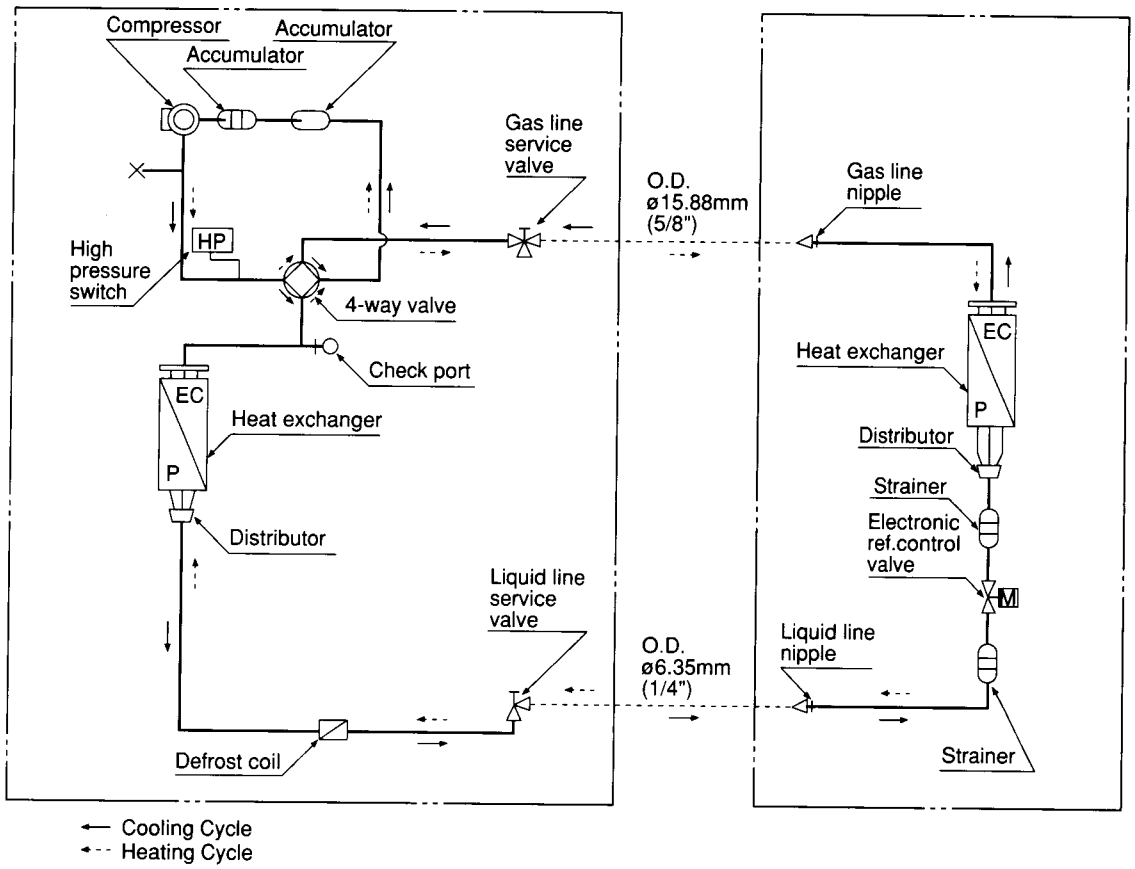


Fig. 3

1-6 Operating Range

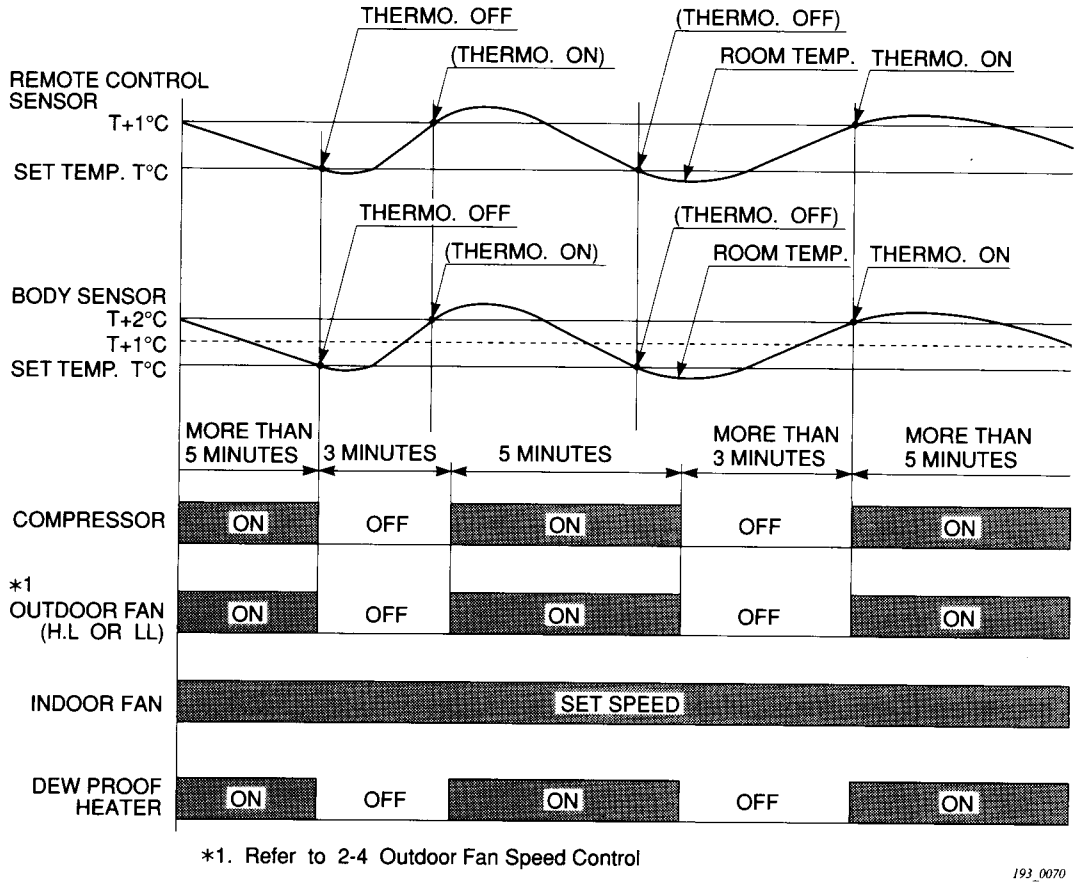
	Temperature	Indoor air intake temp.	Outdoor air intake temp.
Cooling	Maximum	35°C DB / 25°C WB	45°C DB
	Minimum	17°C DB / 14°C WB	–5°C DB
Heating	Maximum	27°C DB / — WB	24°C DB / 18°C WB
	Minimum	16°C DB / — WB	–15°C DB / — WB

2. PROCESSES AND FUNCTIONS

2-1 Room Temperature Control

The Unit adjusts room temperature by cycling the compressor (in the outdoor unit) ON and OFF. This process is controlled by the **thermostat** located in the indoor unit. The diagrams on this and the next page show how each part of the system acts as the temperature of the room changes and the thermostat calls for the compressor to start (**thermo ON**) or stop (**thermo OFF**). Diagram A) tells about the cooling cycle, and Diagram B) tells about the heating cycle.

(A) Cooling



*1. Refer to 2-4 Outdoor Fan Speed Control

193_0070

Fig. 4

Chart Summary and Explanations

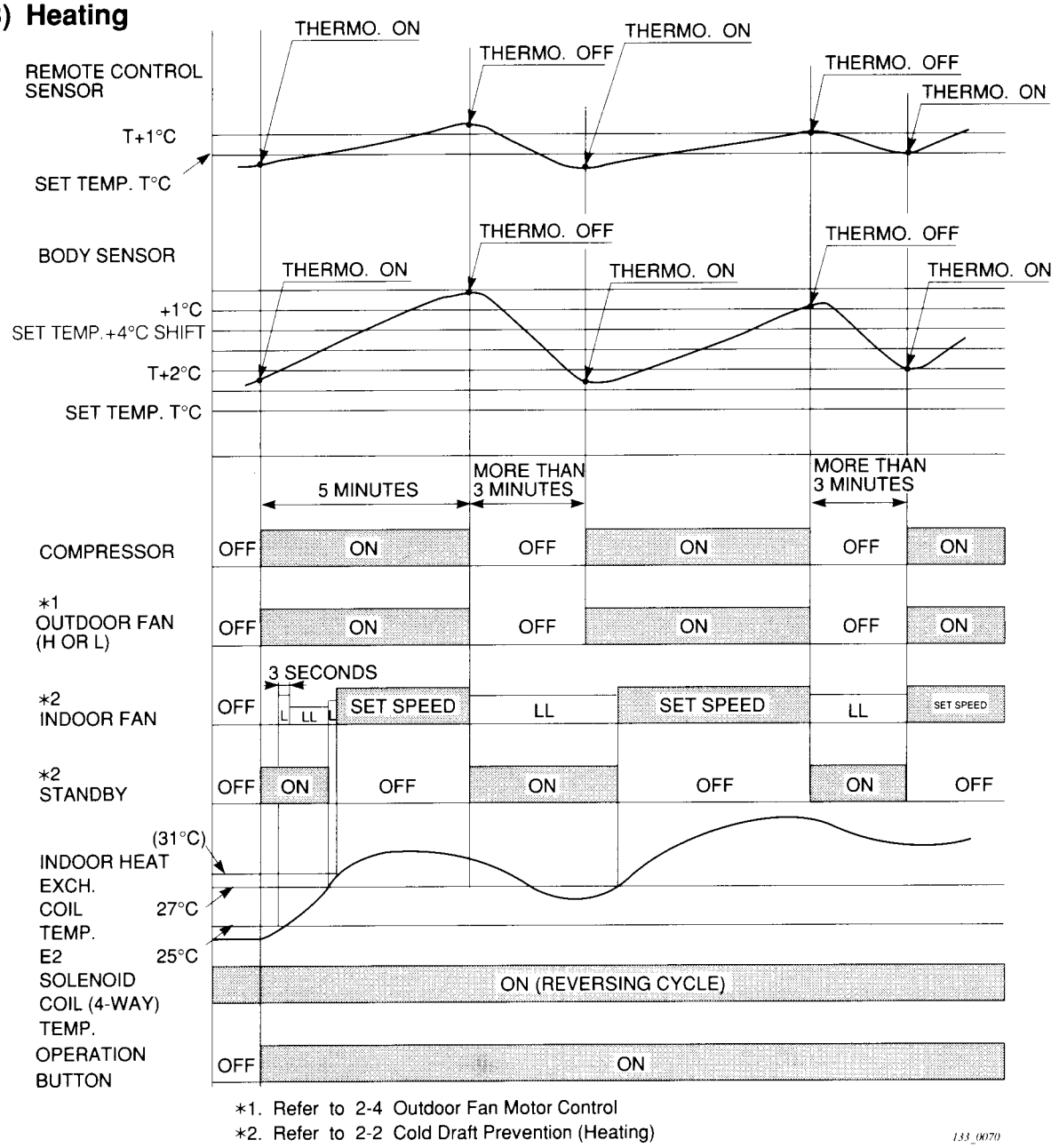
- Once the compressor **starts**, it keeps running for 5 minutes.
- Once the compressor **stops**, it will not start running again for 3 minutes.
- If you **change** the operation mode (**HEAT, DRY, COOL,** or **FAN**) during the cooling cycle, the control circuit **stops** the compressor for 3 minutes.
- For 5 minutes after the compressor is first turned on, and for 3 minutes after it is turned off, the compressor is not controlled by the room sensor.
- **Thermo ON:** When room temperature goes to 2°C (1°C when set on body sensor) above the set temperature T°, (T°+2°C or T°+1°C when set on body sensor):

  Compressor → **ON**

- **Thermo OFF**: When the room temperature is equal to or below the set temperature T°:

  Compressor → **OFF**

(B) Heating



*1. Refer to 2-4 Outdoor Fan Motor Control
*2. Refer to 2-2 Cold Draft Prevention (Heating)

133_0070

Fig. 5

Chart Summary and Explanations

- ❑ Once the compressor starts, it keeps running for 5 minutes.
- ❑ Once the compressor stops, it will not start running again for 3 minutes.
- ❑ If you change the operation mode (**HEAT, DRY, COOL** or **FAN**) during the heating cycle, the control circuit **stops** the compressor for **3 minutes.**
- ❑ For 5 minutes after the compressor is first turned on, and for 3 minutes after it is turned off, the compressor is not controlled by the room sensor.

When set on remote control sensor

Thermo ON: When room temperature is equal to or below the set temperature T°.

Compressor → ON

Thermo OFF: When the room temperature is 1°C above the set temperature T°, (T°+1°C)

Compressor → OFF

When set on body sensor

NOTE: In case of Body sensor, operating temperature is shifted to setting temperature +4°C and the difference is set to 3°C.

2-2 Cold Draft Prevention (Heating Cycle)

The cold draft prevention function controls indoor fan speed so a strong draft of cold air will not blow out before the indoor heat exchange coils have warmed up.

- ❑ STANDBY shows on the remote control unit when the indoor fan speed is LL (very low) or OFF. This condition happens in the following 3 cases:
  - During Thermo OFF (refer to 2-1 B). Room Temperature Control, Heating)
  - During the defrosting operation (refer to 2-10 Defrosting Control, Heating)
  - Until either the coil temperature E2 reaches 27°C or when a maximum of 6 minutes has past.
- ❑ The indoor fan motor operates in **L** instead of **LL** for 3 seconds as it starts to give the fan an initial boost.

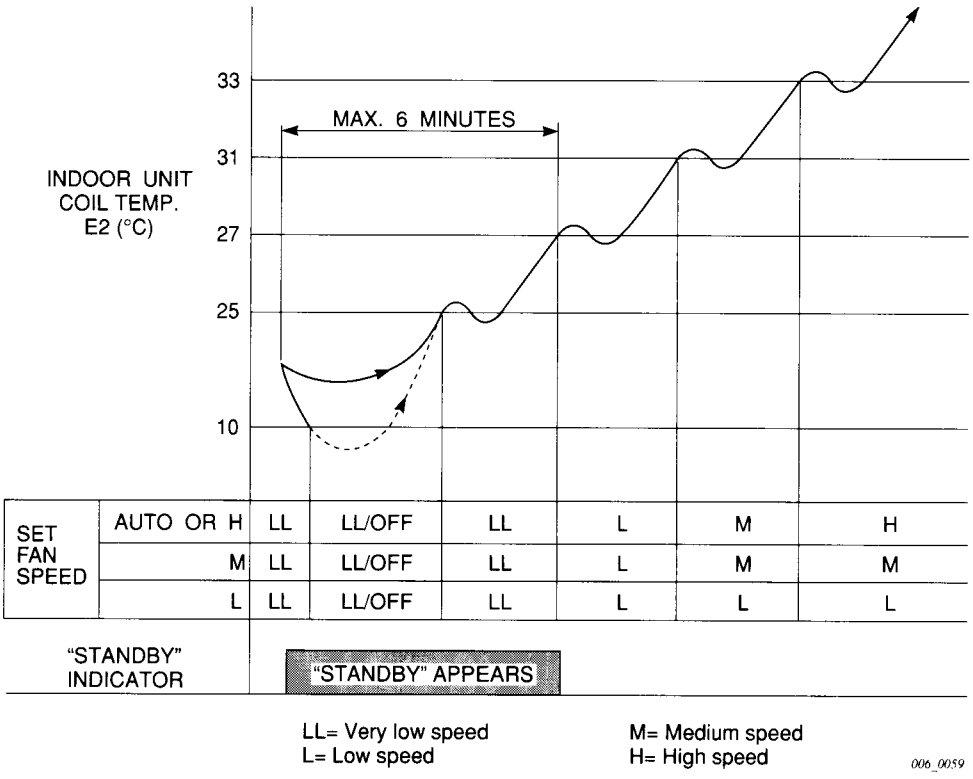


Fig. 6

Chart Summary and Explanations

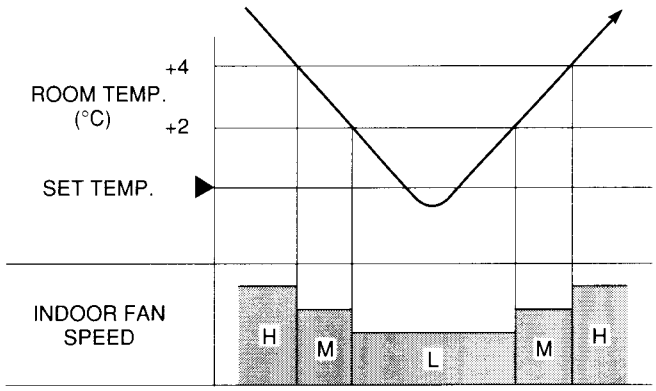
- ❑ The main idea of this chart is to show that the indoor fan speed increases and gets closer to the set fan speed as the coil temperature **E2** rises.
- ❑ The indoor unit's coil temperature is taken from sensor **E2** located in the middle of the indoor heat exchange coil.
- ❑ The dotted line shows that the indoor fan motor is **OFF**. When the temperature at sensor **E2** falls below 10°C, the indoor fan motor stops running.

2-3 Fan Speed Auto (Indoor Unit)

Using the FAN SPEED button on the remote control unit, the fan speed can be set one of four values: AUTO, HI, MED or LO. When set to AUTO, the indoor unit fan speed will automatically adjust to the room temperature as the two charts below show.

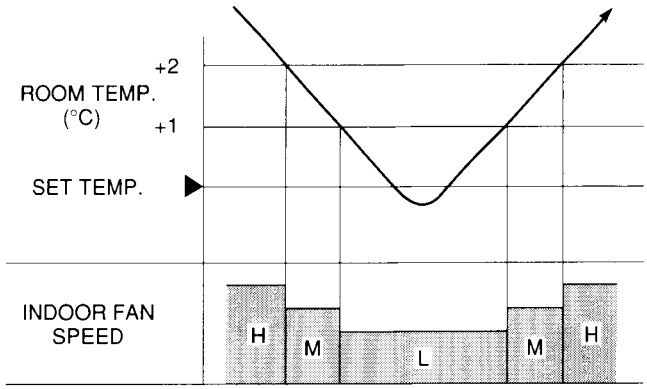
(A) Cooling

When set on body sensor



H = High M = Medium L = Low

When set on remote control sensor



134_070

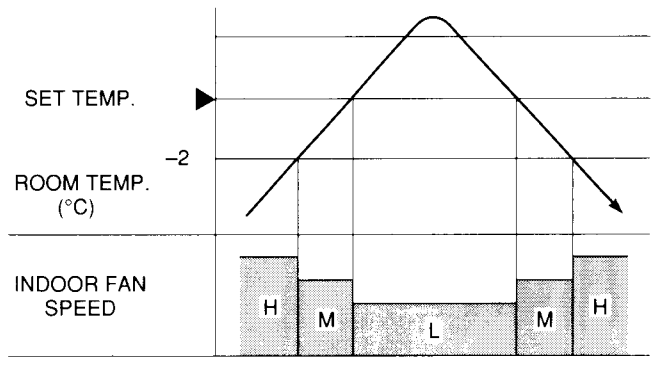
Fig. 7

Chart Explanations and notes

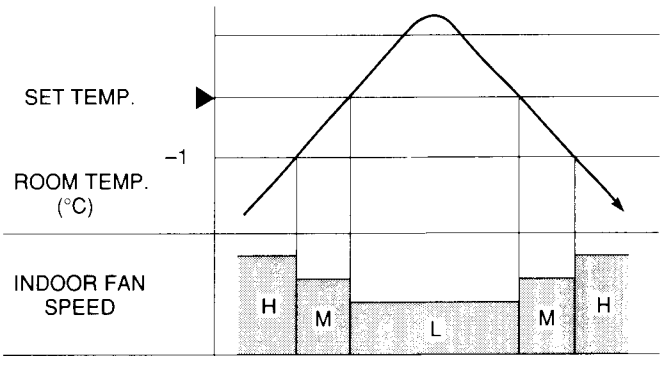
- Each time the fan speed changes, it stays at the speed it changes to (L, M, or H) for at least 3 minutes, even if during that time the temperature changes to another speed's range.

(B) Heating

When set on body sensor



When set on remote control sensor



135_007

Fig. 8

Chart Explanations and notes

- Each time the fan speed changes, it stays at the speed it changes to (L, M, or H) for at least 1 minute, even if during that time the temperature changes to another speed's range.

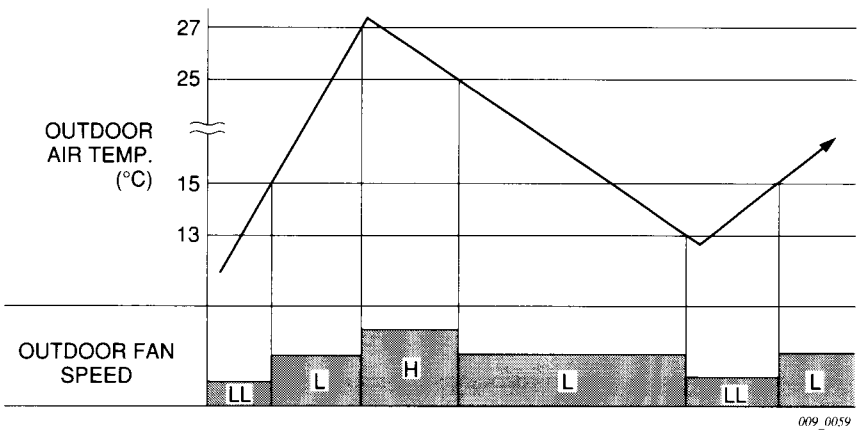
2-4 Outdoor Fan Speed Control

To optimize the performance of air conditioner, the outdoor fan speed is selected automatically according to the outside temperature.

- ❑ Note that in both **Cooling** and **Heating** modes, the fan comes on at first at high speed (H mode) for 5 seconds. Since outdoor conditions sometimes make it difficult for the fan to start, this sudden surge of power may be necessary.

- ❑ These charts show how the outdoor fan speed changes with the change in outdoor temperature.

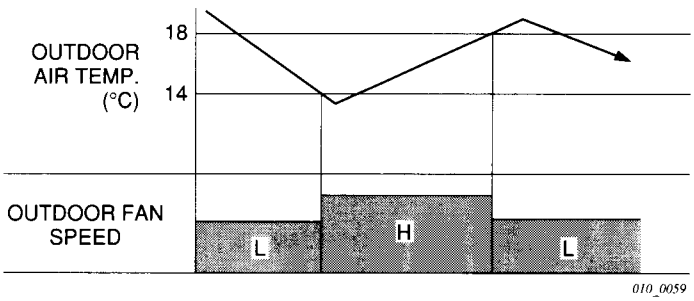
(A) Cooling



LL = Very Low L = Low H= High

Fig. 9

(B) Heating



L = Low H= High

Fig. 10

2-5 Freeze Prevention (Cooling)

Freeze Prevention keeps the indoor heat exchange coil from freezing. Freezing reduces the efficiency of the unit, and frost buildup on the coil blocks cool air circulation from the indoor unit's fan.

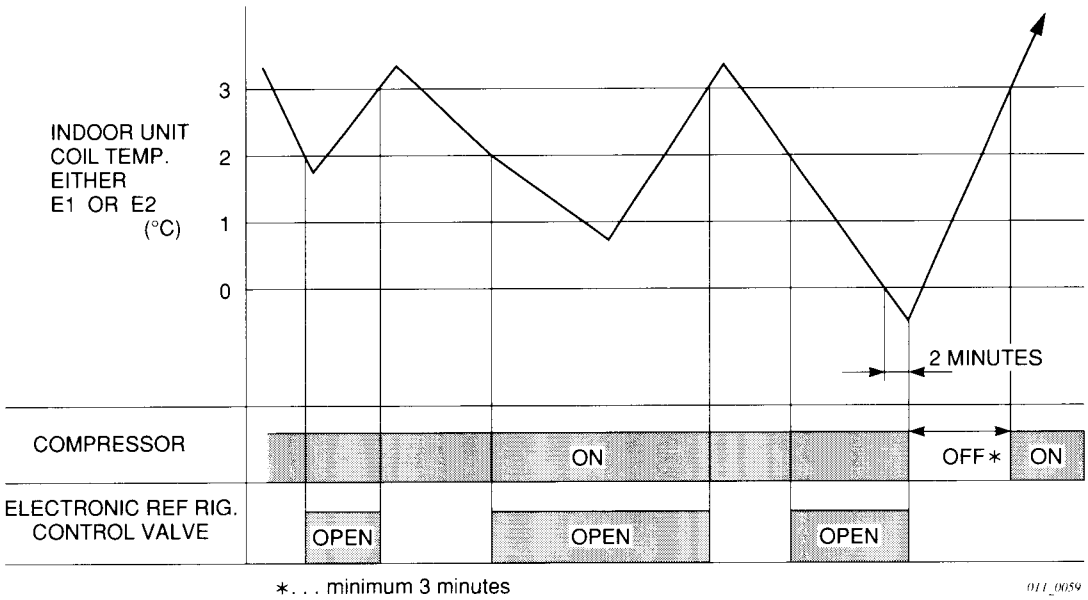


Fig. 11

Chart Explanations and notes

- This chart shows when the **electronic refrigerant control valve** opens to regulate the temperature of the indoor unit coil to prevent freezing.
- Freeze prevention is controlled by the temperature of the indoor heat exchanger coil as sensed by either sensor **E1** (located at the entrance of the coil) or sensor **E2** (located in the middle of the coil). Whichever sensor has the lower temperature controls the freeze prevention cycle.
- When the coil temperature falls below 2°C, the electronic refrigerant control valve opens in 5 intervals at 30 steps/30seconds until the temperature reaches 3°C.
- If the refrigerant control is not effective and the temperature continues to drop and stays below 0°C for 2 minutes consecutively, the control circuit stops the compressor. The compressor does not start again until the temperature rises above 3°C.
  The minimum time the compressor stops for is 3 minutes.
- The Freeze Prevention function does not become active until 8 minutes after the compressor starts.

2-6 Condensing Temperature Control (Cooling)

Condensing temperature is controlled by the outdoor heat exchanger coil temperature as reported by sensor **C2**.

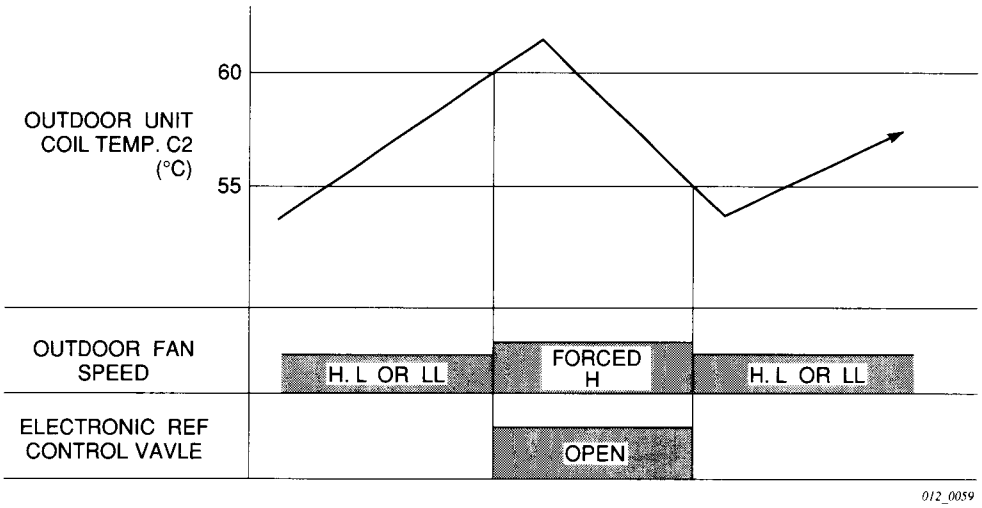


Fig. 12

Chart Explanations and notes

- This chart shows how the outdoor fan speed and the electronic refrigerant control valve react to coil temperature to control condensing temperature.
- Sensor **C2** is located in the middle of the outdoor unit heat exchange coil.
- When **C2** rises above 60°C the electronic refrigerant control valve opens at 50 steps/30 seconds, and the outdoor fan speed is forced to change to high (H) until **C2** falls below 55°C.

2-7 Overload Protection (Heating)

This function prevents overloading of the air conditioner.

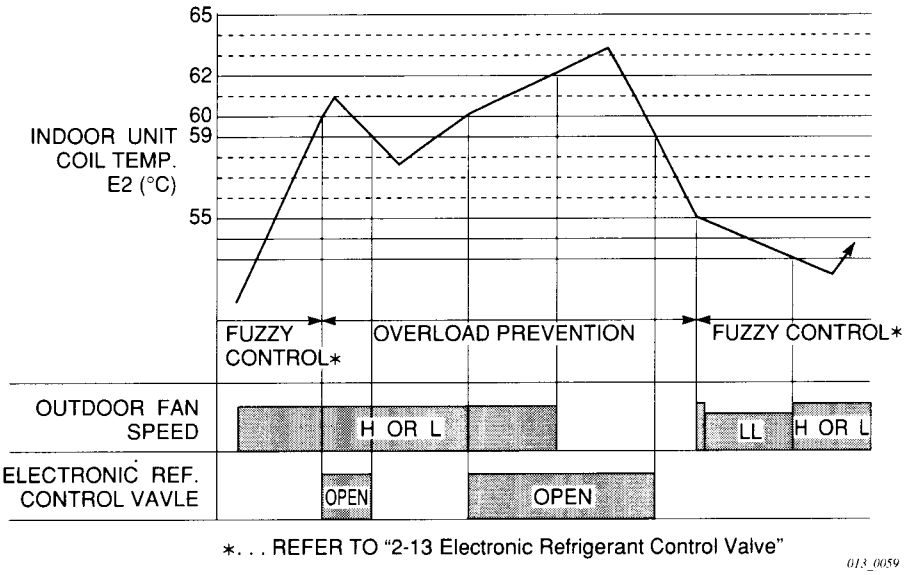


Fig. 13

Chart Explanations and notes

- This chart shows how the outdoor fan speed and the electronic refrigerant control valve react to coil temperature to keep the indoor heat exchanger coil from overloading.
- When sensor **E2** rises above 60°C the electronic refrigerant control valve opens at 50 steps/ 30 seconds until **E2** falls below 59°C.
- Sensor **E2** is located in the middle of the indoor unit heat exchange unit.
- When sensor **E2** rises above 62°C, the control circuit stops the outdoor fan motor.

2

2-8 Discharge Temperature Control (Cooling and Heating)

This function prevents the compressor motor from burnout by overheating.

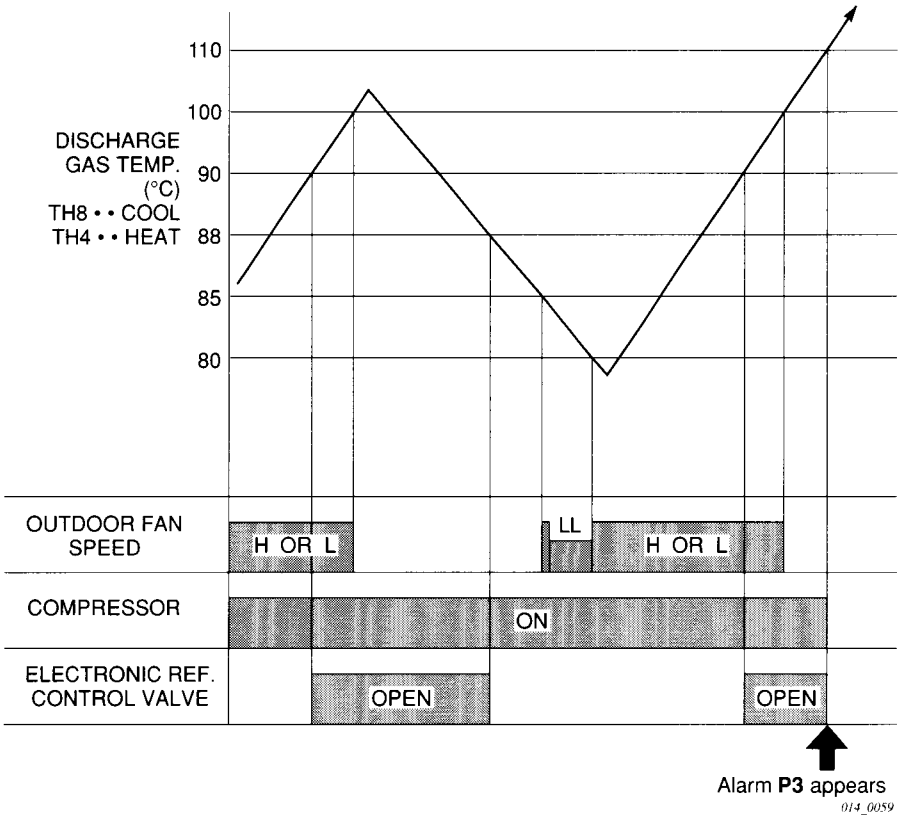


Fig. 14

Chart Summary and Explanations

- Discharge temperature is controlled by **TH8** (discharge gas sensor) in **COOLING** mode, and **TH4** (discharge gas sensor) in **HEATING** mode.
- When the temperature rises **above 90°C** the electronic refrigerant control valve opens at 50 steps/30 seconds until the temperature falls **below 88°C**.
- During **HEATING** operation, when the temperature rises **above 100°C**, the control circuit stops the outdoor fan motor until the temperature falls below 85°C. Note that this control does not function during **COOLING** operation.
- For both **COOLING** and **HEATING** modes, if the temperature reaches **110°C** the operation shuts down and alarm **P3** appears on the remote control unit.

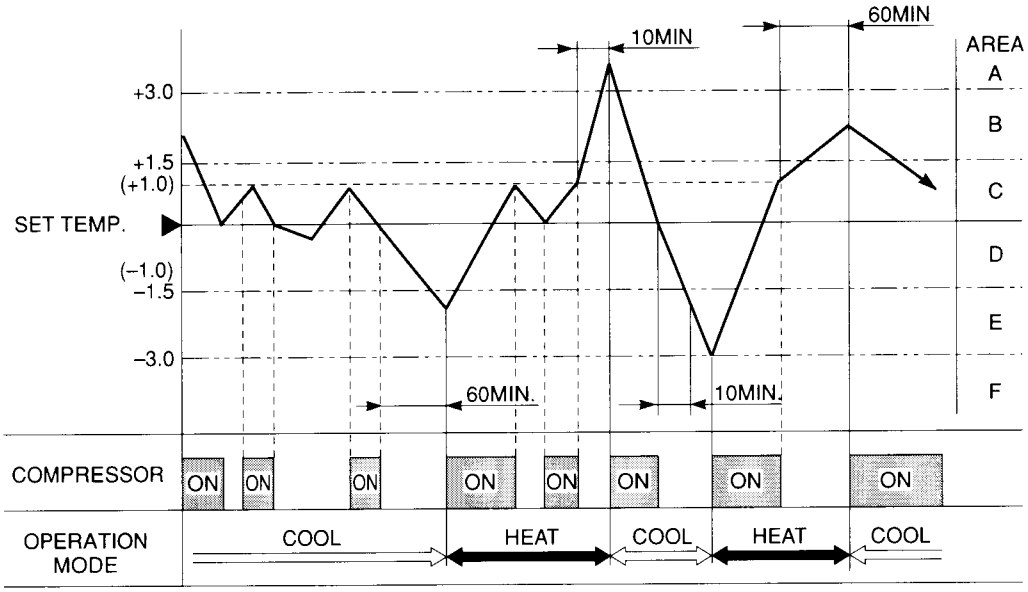
2-9 Auto Mode for Automatic Heating/Cooling Switching

- When the AUTO mode is selected, the microprocessor calculates the difference between the set temperature and the room temperature, and automatically switches to the COOLING or HEATING mode to maintain the desired temperature.

Room temp. $\geqq$ Set temp. → COOL
Room temp. $<$ Set temp. → HEAT

This means that if the room temperature is **higher or equal to** the set temperature, **COOLING** operation begins. If the room temperature is **lower** than the set temperature, **HEATING** operation begins.

(A) Remote control sensor



(B) Body sensor

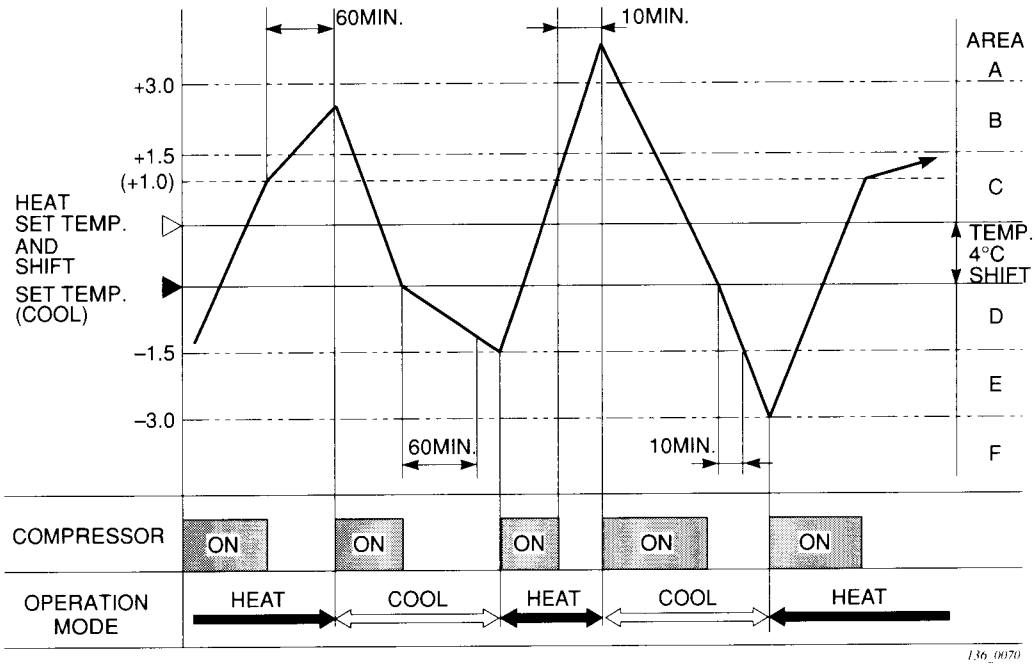


Fig. 15

Chart summary and explanations

- This chart shows how the Operation Mode (**COOLING** or **HEATING**) is determined by the microprocessor taking both the room temperature and the compressor ON time into consideration. It also shows the temperature points at which the cooling and heating modes switch, when the AUTO mode is selected.
- There is no mode change of COOL or HEAT within C and D area. Thus small changes from the set temperature will not cause the unit to switch back and forth erratically between heating and cooling.
- COOL mode is selected in B area and HEAT mode is selected in E area provided that the compressor has stopped for more than 60 minutes.
- COOL mode is selected in A area and HEAT mode is selected in F area provided that the compressor has stopped for more than 10 minutes.
- When the outdoor ambient temperature exceeds 25°C in HEAT mode, the indoor fan speed is set to "L" and stops the compressor.

2-10 Defrosting Control, Outdoor Heat Exchanger Coil (Heating)

When the outdoor temperature is low, frost may gather on the outdoor heat exchanger coil. When this happens, the defrosting system operates. The microprocessor in the outdoor unit monitors the relationship between the temperature of the outdoor heat exchanger coil and the outdoor temperature so it can defrost when necessary.

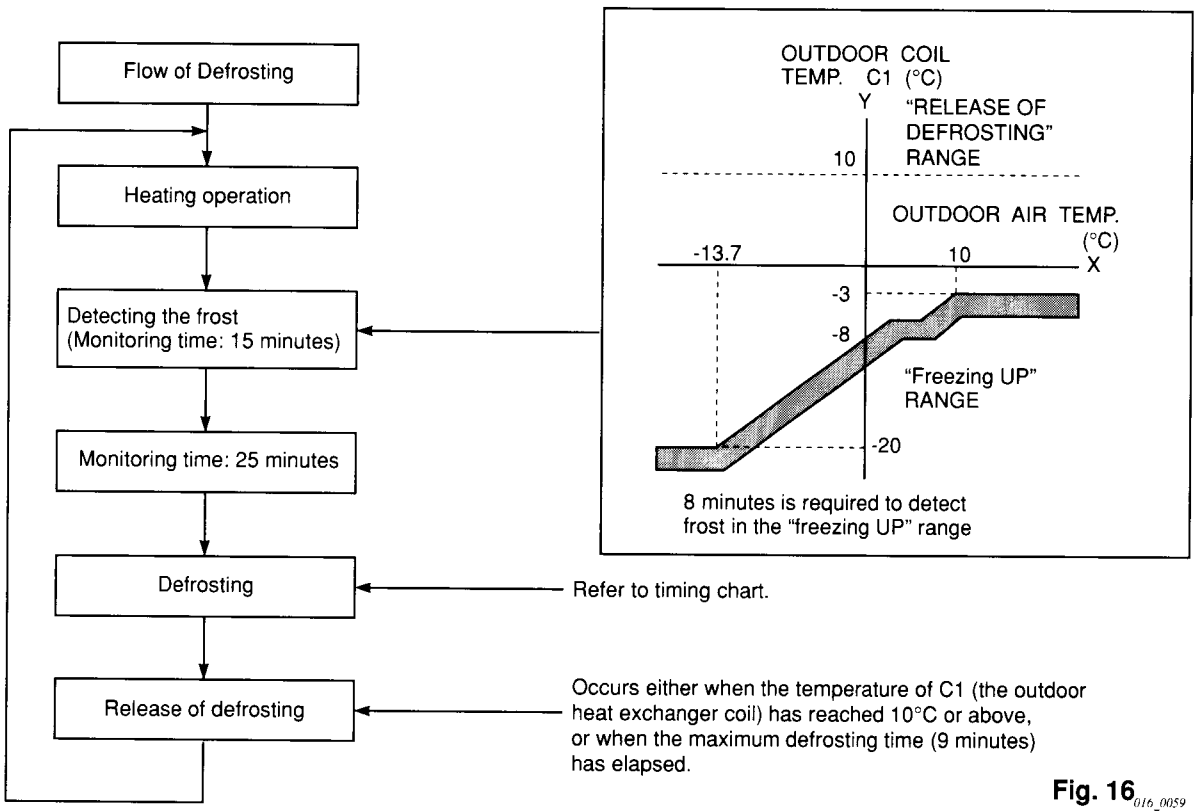


Fig. 16 016_0059

Timing Chart for Defrosting

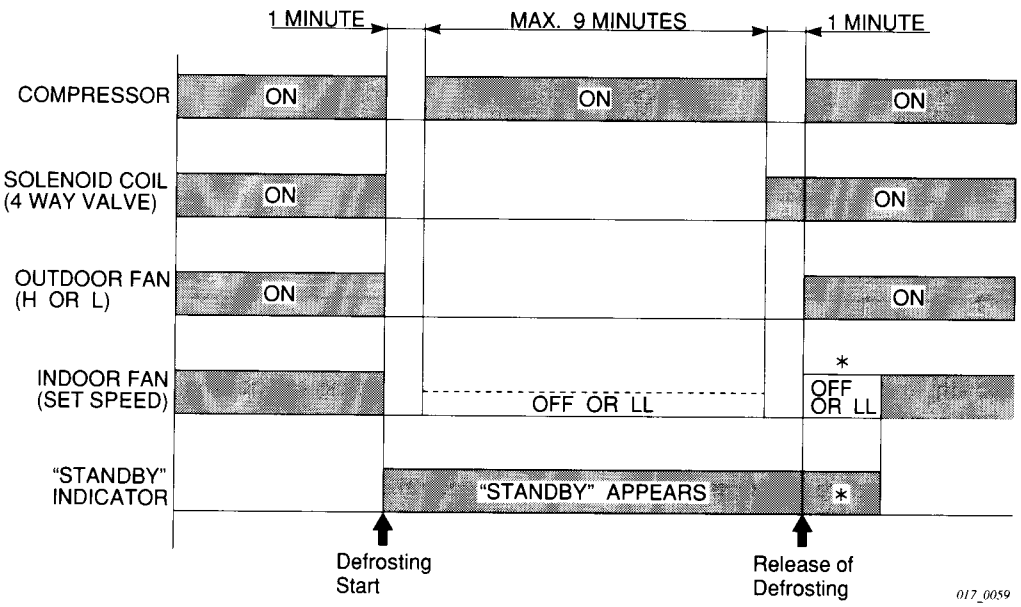


Fig. 17 017_0059

- ❑ During the defrost cycle, **STANDBY** appears on the remote control unit.
- ❑ *.....**Cold Draft Prevention** may operate occasionally

2-11 4-Way Valve, Solenoid Control

The basic function of the 4-way valve is to direct the refrigerant in the correct direction according to the Operation Mode (**COOLING** or **HEATING**) selected. Refer to Section **1-5 Refrigerant Flow Diagram**.
The following two charts show conditions of the controls and functions listed in the left hand column when the solenoid is **ON** or **OFF**. Chart (A) on this page shows the relationships when the temperature control is in **NORMAL** mode, and Chart (B) on the next page shows the relationships when the remote control unit is set to **AUTO** mode.

(A) Normal Control Mode

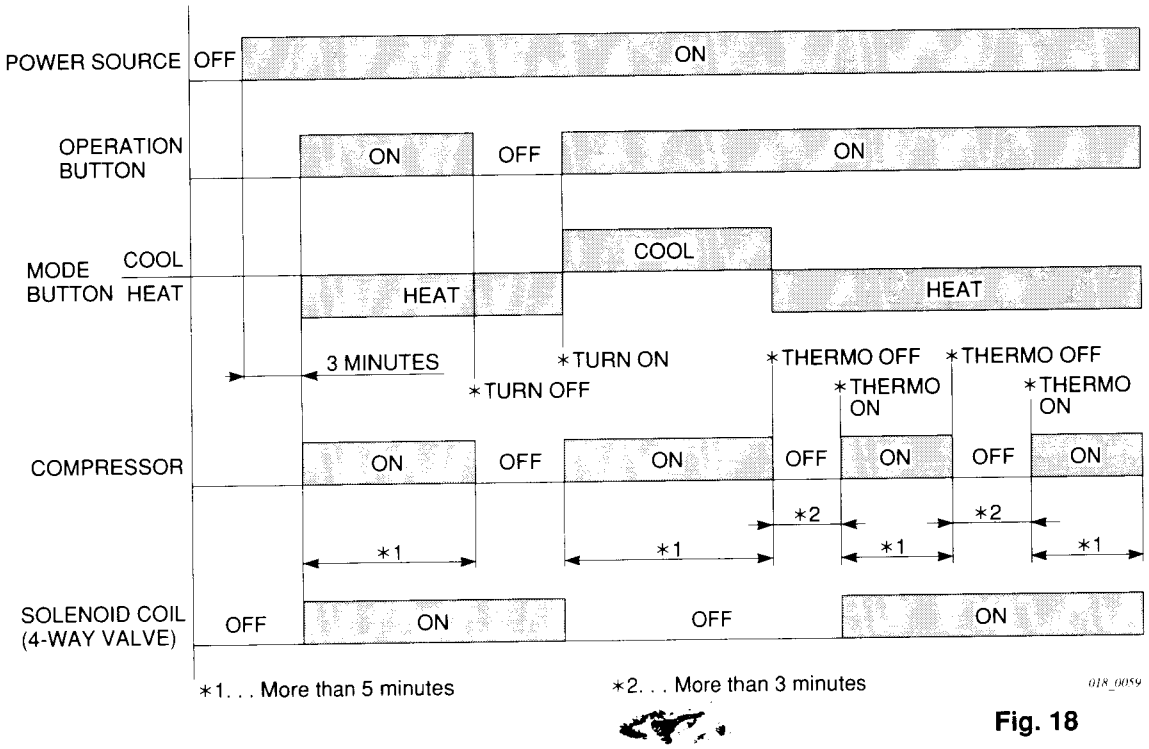


Fig. 18

Chart Summary and explanations

- For the first 3 minutes after power is first applied, the 4–way valve remains OFF and the compressor will not operate, even if the ON button is pushed.
- If the 4–way valve is turned OFF with the compressor operating, the air conditioner operates in COOLING mode. See Table below.
- If the 4–way valve is turned ON with the compressor operating, the air conditioner operates in HEATING mode. See Table below.

Operation Mode	4-way valve solenoid	Compressor
COOLING	OFF	ON
HEATING	ON	

(B) AUTO Control Mode

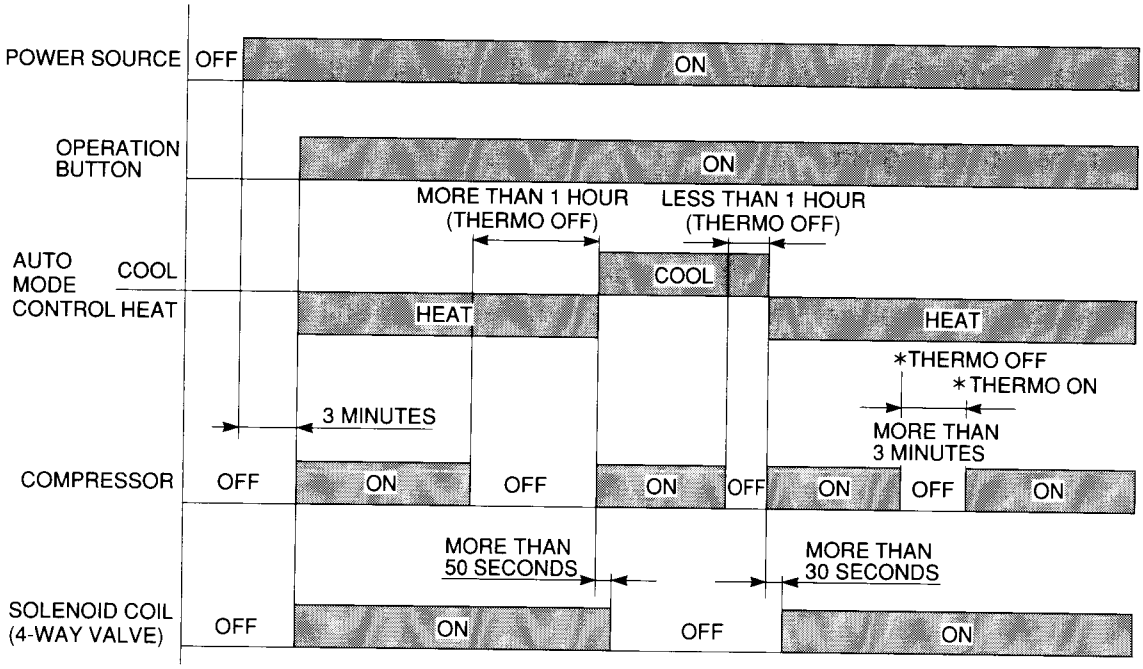


Fig. 19

When the Compressor has stopped while in **AUTO** mode, the 4-way valve switches with different delays according to the following conditions:

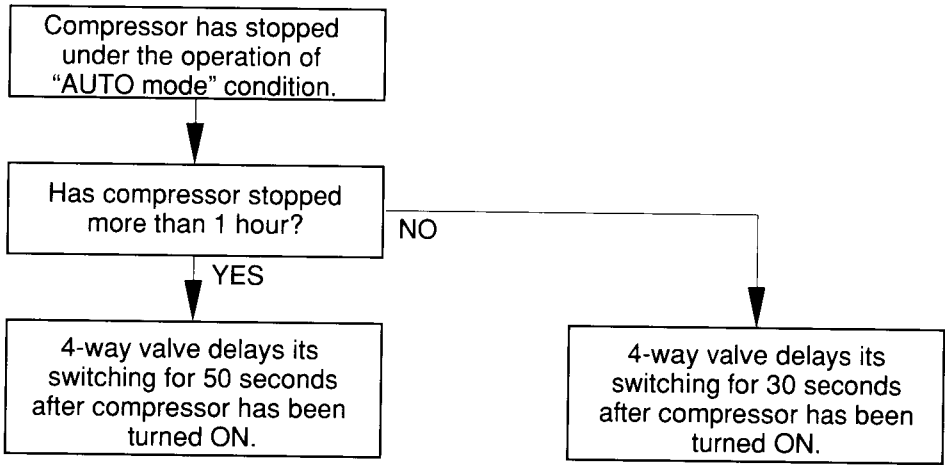


Fig. 20

2-12 Automatic Restart after Power Interruption

When the power comes back on after a power failure, the air conditioner will start again automatically at the same settings as before the failure. In order for the settings to be saved, the battery back-up switch must be set to **ON**, as described below.

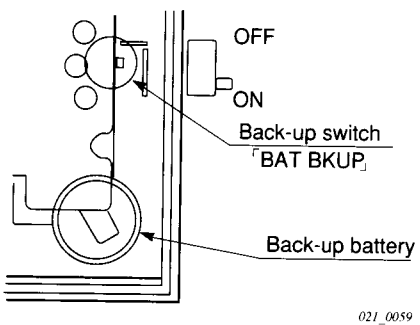


Fig. 21

- ❑ Set the battery back-up switch to ON.
  - The battery back-up switch is located on the back of the P.C.B. Ass'y on the reverse side of the remote control unit. See **Fig. 21**.

2-13 Electronic Refrigerant Control Valve

❑ This valve allows very precise and smooth control of the amount of refrigerant flowing in the system. Since the valve is operated by a step motor, the control circuits can open or close it in very exact amounts, so the degree of heating or cooling can be changed by just a little, or changed very quickly or slowly.

(Completely close ..... 0 step)

(Full open ..... 500 ± 20 step)

Model	Min. open		Max. open
	HEAT	COOL	
SPW-T252GH5	100 step	125 step	480 step

❑ **Fuzzy Control**

Fuzzy Control is a special kind of decision making built into the control system. It regulates the functions of heating and cooling, as well as some of the processes inside the unit, by taking account of many different conditions of temperature, fan speed, etc. These control circuits work automatically to send just the right amount of refrigerant through the **Electronic Refrigerant Control Valve**.

2

2-14 Compressor Discharge Gas Temperature

(A) Cooling

Indoor temp. (°C)	20 – 25		26 – 28	29 – 32
Outdoor temp. (°C)	13 or less	14 – 16	27 – 35	36 – 43
Compressor discharge gas temp. (°C)	40 – 80	40 – 90	60 – 100	70 – 105

(B) Heating (Except During Defrosting)

Indoor temp. (°C)	18 – 21		22 – 25			26 – 30		
Outdoor temp. (°C)	0 or less	1 – 10	0 or less	1 – 10	11 – 21	0 or less	1 – 10	11 – 21
Compressor discharge gas temp. (°C)	40 – 80	50 – 90	40 – 90	50 – 100	60 – 105	50 – 90	60 – 100	70 – 105

❑ Operate the unit at least 30 minutes to stabilize the discharge temperature.

❑ The above discharge temperature was measured with a 15m tubing length. The temperature may vary with tubing length.

2-15 Compressor Current Detection Circuit

- The Compressor Current Detection Circuit detects the compressor current and, depending on the current range, can shut down the compressor motor so it will not be damaged from too much current.
- Too much current can be caused by several factors, particularly mechanical seizing of the compressor or liquid backflow. Either of these conditions can hold the compressor to run, and thus drawing so much current that the motor can burn out.

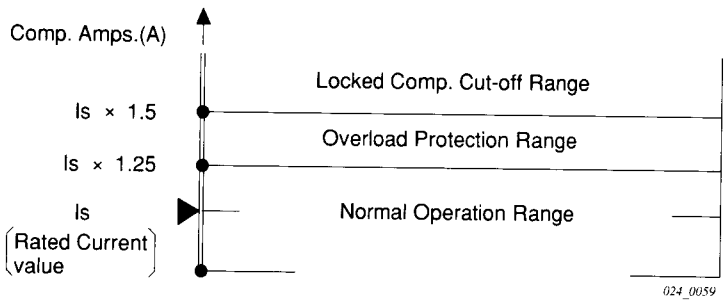


Fig. 22

Outdoor Model	Rated Current Value Is (A)	Overload Protection Is x 1.25 (A)	Locked Compressor Cut-off Is x 1.5 (A)
SPW-C252GH8	6	7.8	9.4

Chart Summary and Explanations

- **Overload Protection**
  - When the detected current is 1.25 – 1.5 times greater than the rated current value (Is) and continues for 30 seconds, both compressor and outdoor fan stop (Thermostat **OFF**).
  - After 3-minute pause, if the air conditioner is ready for Thermostat **ON**, it starts again. However, if the function mentioned above repeats **twice within 30 minutes**, the remote control unit displays the alarm message **H1**, **compressor overload**.
- **Locked Compressor Cut-off**
  - When the detected current is **1.5 times greater** than the rated current value (Is) and **continues for 2 seconds**, both compressor and outdoor fan stop (Thermostat **OFF**).
  - After 3-minute pause, if the air conditioner is ready for Thermostat **ON**, it starts again. However, if the function mentioned above repeats **twice**, the remote control unit displays the alarm message **H2**, **compressor load**.
- **Failure of Compressor Current Detection Circuit**
  - When the Compressor Current Detection Circuit fails to detect the compressor current **within 2 seconds of compressor start-up**, both compressor and outdoor fan stop (Thermostat **OFF**).
  - After 3-minute pause, if the air conditioner is ready for Thermostat **ON**, it starts again. However, when the circuit fails to detect the current twice in a row, the remote control unit displays alarm message **H3, Failure of compressor Current Detection Circuit.**

2-16 Dry Operation (Dehumidification)

DRY operation uses the ability of the cooling cycle to remove moisture from the air, but by running at a low level, to dehumidify without greatly reducing room temperature. In this mode, the microprocessor automatically controls the ON-OFF operation between +2 and -2 of the set temperature.

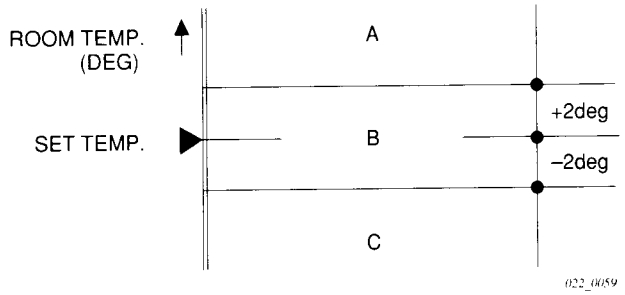


Fig. 23

A range: When the room temperature is in this range, cooling operation starts. However, when the temperature is below 18°C, the cooling operation does not start.

B range: When the room temperature is in this range, the air conditioner automatically repeats the DRY cycle of 5 minutes **ON**, 4 minutes **OFF** – see **Fig. 24** for details.

C range: When the room temperature is in this range, the control circuit shuts off the air conditioner entirely.

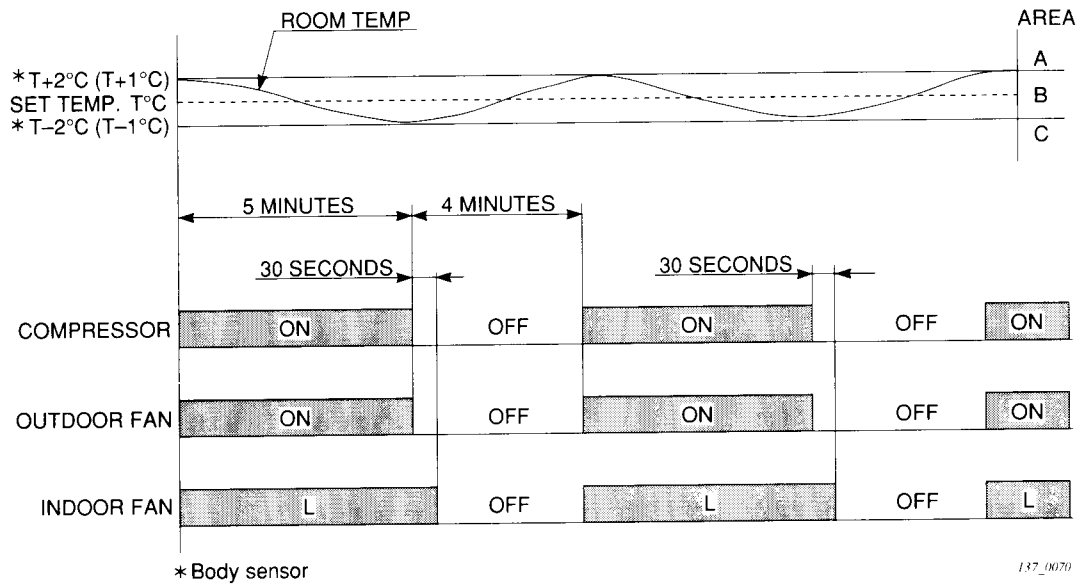
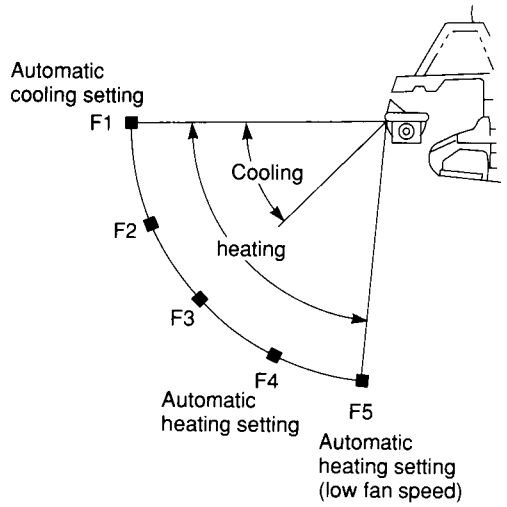


Fig. 24

- ❑ The indoor fan speed is automatically set to **L** and cannot be adjusted.
- ❑ When the outdoor temperature falls below 15°C, the control circuit stops the **DRY** operation regardless of room temperature.
- ❑ When the set temperature is either 18 or 19°C, the set temperature is considered the same as 20°C.
- ❑ Room temperature is monitored every 9 minutes when it is in the **B** range to select the best operation mode.

2-17 Air Flap Control



190_0065 **Fig. 25**

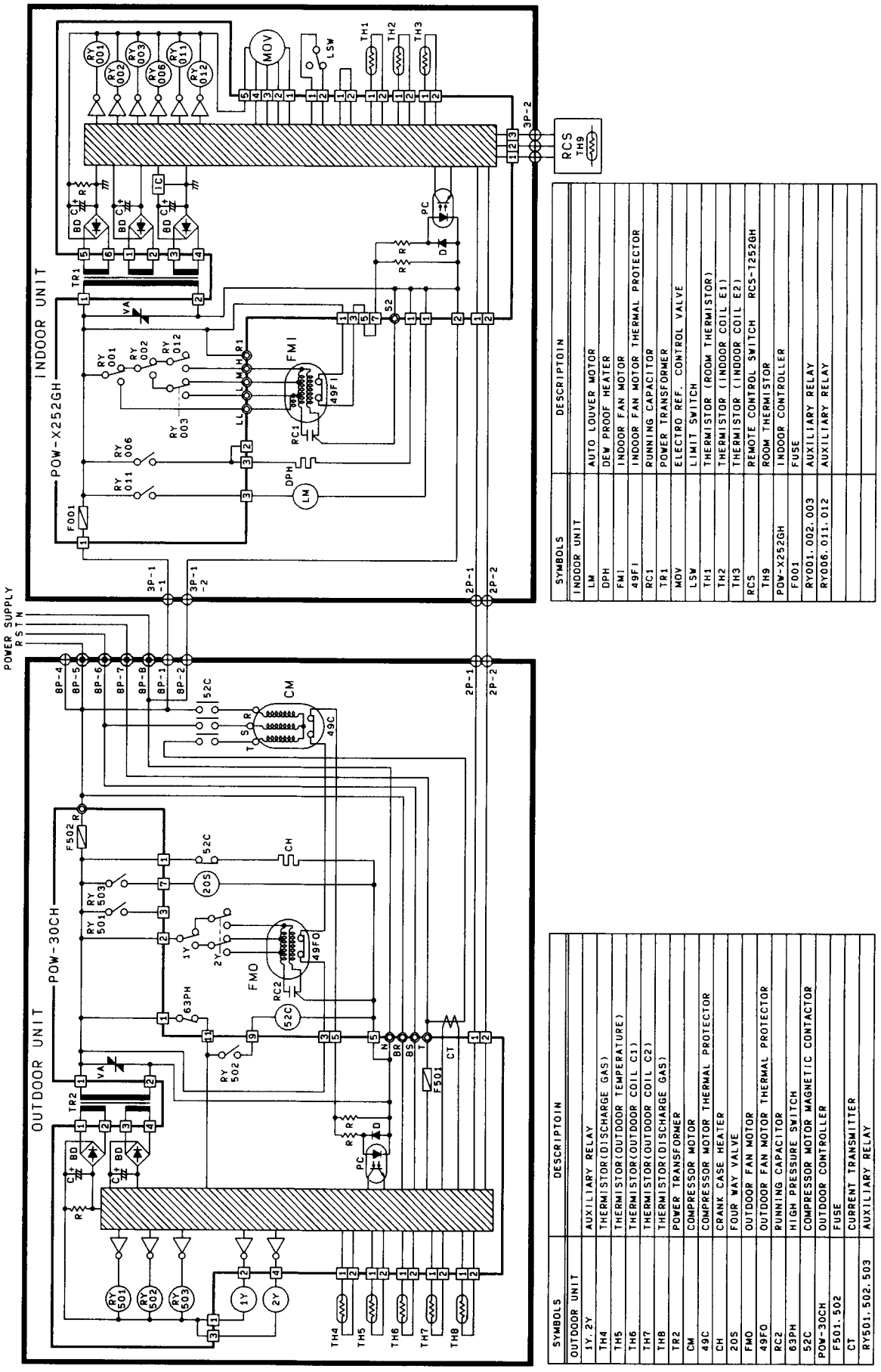
Remote Control unit	Operation Mode	Flap Position		
		When swing is off		When swinging
		Automatic setting	Optional setting	
Swing	COOL/FAN/DRY	F1	The position before swing	Swing from F1 to F5
	HEAT High fan speed Low fan speed	F4 F5		
	Standby for heating	F2	(after standby mode is released, the flap returns the original position)	F2 (after the standby mode is released, the flap swings between F1 and F5)

Remote Control Unit	Operation Mode	Flap Position
Settings of Airflow Direction	COOL/DRY	F1, F2, F3 (An optional setting)
	HEAT/FAN	F1, F2, F3, F4, F5 (An optional setting)
	Standby for heating	F2 (after release of the standby mode, the flap returns to the original position)

(1) When the unit is stopped, the Auto Flap returns to F5 position.
(2) When the airflow direction is set (an optional setting), the auto and Swing settings will be released. To return to automatic airflow direction, change the operation mode.
(3) Once Auto Flap is set, it will be input in the memory.
(4) When the operation mode is changed, the unit begins a sensing operation. (if a search action for sensing point is not succeeded in one minute, only the flap moves.)

3. ELECTRICAL DATA

3-1 Schematic Diagram, Indoor and Outdoor Units



SYMBOLS	DESCRIPTOIN
INDOOR UNIT	
LM	AUTO LOUVER MOTOR
DPH	DEW PROOF HEATER
FMI	INDOOR FAN MOTOR
49FI	INDOOR FAN MOTOR THERMAL PROTECTOR
RC1	RUNNING CAPACITOR
TR1	POWER TRANSFORMER
MOV	ELECTRO REF. CONTROL VALVE
LSW	LIMIT SWITCH
TH1	THERMISTOR (ROOM THERMISTOR)
TH2	THERMISTOR (INDOOR COIL E1)
TH3	THERMISTOR (INDOOR COIL E2)
RCS	REMOTE CONTROL SWITCH RCS-T252GH
TH9	ROOM THERMISTOR
POW-X252GH	INDOOR CONTROLLER
F001	FUSE
RY001.002.003	AUXILIARY RELAY
RY006.011.012	AUXILIARY RELAY

SYMBOLS	DESCRIPTOIN
OUTDOOR UNIT	
1Y.2Y	AUXILIARY RELAY
TH4	THERMISTOR(DISCHARGE GAS)
TH5	THERMISTOR(OUTDOOR TEMPERATURE)
TH6	THERMISTOR(OUTDOOR COIL C1)
TH7	THERMISTOR(OUTDOOR COIL C2)
TH8	THERMISTOR(DISCHARGE GAS)
TR2	POWER TRANSFORMER
CM	COMPRESSOR MOTOR
49C	COMPRESSOR MOTOR THERMAL PROTECTOR
CH	CRANK CASE HEATER
20S	FOUR WAY VALVE
FMO	OUTDOOR FAN MOTOR
49FO	OUTDOOR FAN MOTOR THERMAL PROTECTOR
RC2	RUNNING CAPACITOR
63PH	HIGH PRESSURE SWITCH
52C	COMPRESSOR MOTOR MAGNETIC CONTACTOR
POW-30CH	OUTDOOR CONTROLLER
F501.502	FUSE
CT	CURRENT TRANSMITTER
RY501.502.503	AUXILIARY RELAY

Fig. 26

3-2 Electric Wiring Diagram, Indoor Unit

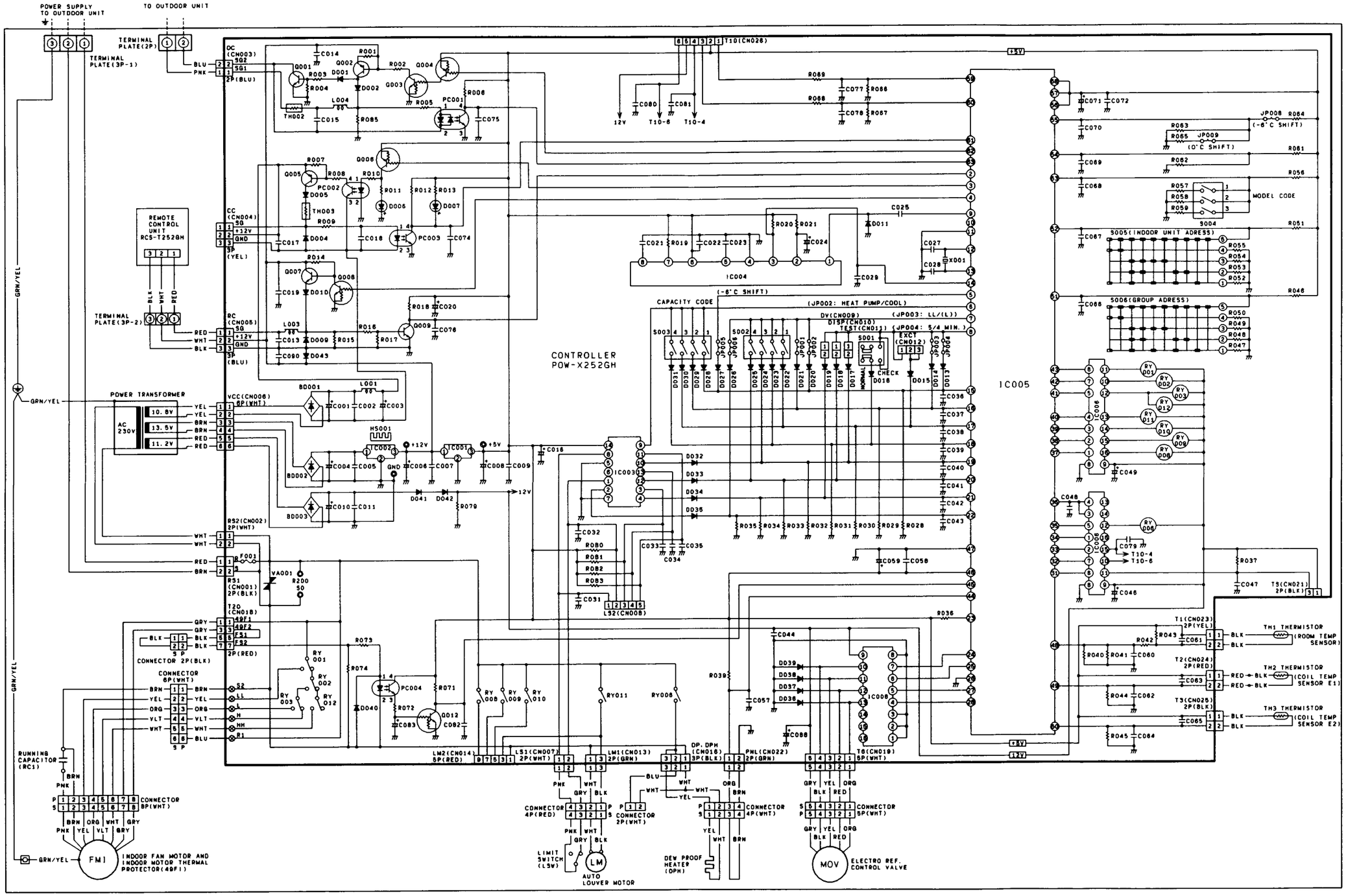


Fig. 27

SM700064

3-3 Indoor Unit P.C.B. Ass'y Component List (POW-X252GH)

SYMBOLS	DESCRIPTION	SPECIFICATIONS
C001	CAPACITOR	2200μF 20% 25V
C002	CAPACITOR	0.022μF 50V
C003	CAPACITOR	100μF 20% 25V
C004	CAPACITOR	2200μF 20% 25V
C005	CAPACITOR	0.022μF 50V
C006	CAPACITOR	100μF 20% 25V
C007	CAPACITOR	0.022μF 50V
C008	CAPACITOR	100μF 20% 16V
C009	CAPACITOR	0.022μF 50V
C010	CAPACITOR	2200μF 20% 25V
C011	CAPACITOR	0.022μF 50V
C013	CAPACITOR	0.01μF 10% 50V
C014	CAPACITOR	0.022μF 50V
C015	CAPACITOR	0.01μF 250V
C016	CAPACITOR	47μF 20% 16V
C017	CAPACITOR	0.022μF 50V
C018	CAPACITOR	0.001μF 10% 50V
C019	CAPACITOR	0.022μF 50V
C020	CAPACITOR	47μF 20% 16V
C021	CAPACITOR	0.001μF 10% 50V
C022	CAPACITOR	0.01μF 10% 50V
C023	CAPACITOR	0.001μF 10% 50V
C024	CAPACITOR	22μF 20% 50V
C025	CAPACITOR	0.047μF 10% 50V
C027	CAPACITOR	15PF 5% 50V
C028	CAPACITOR	15PF 5% 50V
C029	CAPACITOR	0.001μF 10% 50V
C031	CAPACITOR	0.01μF 10% 50V
C032	CAPACITOR	0.01μF 10% 50V
C033	CAPACITOR	0.01μF 10% 50V
C034	CAPACITOR	0.01μF 10% 50V
C035	CAPACITOR	0.01μF 10% 50V
C036	CAPACITOR	0.001μF 10% 50V
C037	CAPACITOR	0.001μF 10% 50V
C038	CAPACITOR	0.001μF 10% 50V
C039	CAPACITOR	0.001μF 10% 50V
C040	CAPACITOR	0.001μF 10% 50V
C041	CAPACITOR	0.001μF 10% 50V
C042	CAPACITOR	0.001μF 10% 50V
C043	CAPACITOR	0.001μF 10% 50V
C044	CAPACITOR	0.022μF 50V
C046	CAPACITOR	47μF 20% 25V
C047	CAPACITOR	0.001μF 10% 50V
C048	CAPACITOR	0.01μF 10% 50V
C049	CAPACITOR	47μF 20% 25V
C057	CAPACITOR	0.022μF 50V
C058	CAPACITOR	0.022μF 50V
C059	CAPACITOR	100μF 20% 16V
C060	CAPACITOR	0.047μF 10% 50V
C061	CAPACITOR	0.022μF 10% 50V
C062	CAPACITOR	0.047μF 10% 50V
C063	CAPACITOR	0.022μF 10% 50V
C064	CAPACITOR	0.047μF 10% 50V
C065	CAPACITOR	0.022μF 10% 50V
C066	CAPACITOR	0.01μF 50V
C067	CAPACITOR	0.01μF 50V
C068	CAPACITOR	0.01μF 50V
C069	CAPACITOR	0.01μF 50V
C070	CAPACITOR	0.01μF 50V
C071	CAPACITOR	100μF 20% 16V
C072	CAPACITOR	0.022μF 50V
C074	CAPACITOR	0.001μF 10% 50V
C075	CAPACITOR	0.001μF 10% 50V
C076	CAPACITOR	0.001μF 10% 50V
C077	CAPACITOR	0.001μF 10% 50V
C078	CAPACITOR	0.001μF 10% 50V
C079	CAPACITOR	0.001μF 10% 50V
C080	CAPACITOR	0.001μF 10% 50V

SYMBOLS	DESCRIPTION	SPECIFICATIONS
C081	CAPACITOR	0.001μF 10% 50V
C082	CAPACITOR	0.01μF 50V
C083	CAPACITOR	10μF 20% 50V
C088	CAPACITOR	47μF 20% 25V
C090	CAPACITOR	0.047μF 10% 50V
CN001	CONNECTOR	J5289-2A-BL
CN002	CONNECTOR	J5289-2A-WH
CN003	CONNECTOR	J8263B-0202-B
CN004	CONNECTOR	J8263B-0302-Y
CN005	CONNECTOR	J8263B-0302-B
CN006	CONNECTOR	J8263-0612-0
CN007	CONNECTOR	J8263B-0202-W
CN008	CONNECTOR	J8263-0512-0
CN009	CONNECTOR	JSB2P-HVQ-CA.-E
CN010	CONNECTOR	JSB2P-HVQ-CA.
CN011	CONNECTOR	JSB2P-HVQ-CA.-R
CN012	CONNECTOR	J8263-0312-2
CN013	CONNECTOR	J8263B-0205-G
CN014	CONNECTOR	J8263-0514-2
CN016	CONNECTOR	J5289-3A-BL
CN018	CONNECTOR	J8263-0414-2
CN019	CONNECTOR	JB5P-SHF-1AA
CN021	CONNECTOR	J8263-0214-1
CN022	CONNECTOR	J8263B-0202-G
CN023	CONNECTOR	J8263B-0202-Y
CN024	CONNECTOR	J8263B-0202-R
CN025	CONNECTOR	J8263B-0202-K
CN028	CONNECTOR	J8180-6P
D001	DIODE	DSK10E-BT
D002	DIODE	DSK10E-BT
D004	DIODE	DSB010-TA
D005	DIODE	DSK10E-BT
D006	DIODE	SLP-281B
D007	DIODE	SLP-181B
D009	DIODE	DSB010-TA
D010	DIODE	DSK10E-BT
D011	DIODE	DSB010-TA
D013	DIODE	DSB010-TA
?		
D040	DIODE	DSB010-TA
D041	DIODE	DSK10C-BT
D042	DIODE	DSK10C-BT
D043	DIODE	DSB010-TA
BD001	BRIDGE DIODE	DBA10C
BD002	BRIDGE DIODE	DBA10C
BD003	BRIDGE DIODE	DBF20C
F001	FUSE	250V 5A
HS001	HEAT SINK	T220Q
IC001	IC	L7805ML
IC002	IC	L7812-HS
IC003	IC	MLC74HC14AM
IC004	IC	M5295L
IC005	IC	UPD78328GF-3
IC006	IC	LB1234
IC007	IC	LB1234
IC008	IC	TD62003AP
JP001	SHORT BAR	IPS-1075-1
JP002	SHORT BAR	IPS-1075-1
JP003	SHORT BAR	IPS-1075-1
JP004	SHORT BAR	IPS-1075-1
JP005	SHORT BAR	IPS-1075-1
JP006	SHORT BAR	IPS-1075-1
JP008	SHORT BAR	IPS-1075-1
JP009	SHORT BAR	IPS-1075-1
L001	AF FILTER	EL0909SKJ-101K-2
L003	AF FILTER	EL0909SKJ-101K-2
L004	AF FILTER	EL0909SKJ-101K-2
PC001	PHOTOCOUPLER	PC814A

SYMBOLS	DESCRIPTION	SPECIFICATIONS
PC002	PHOTOCOUPLER	PC817B
PC003	PHOTOCOUPLER	PC817B
PC004	PHOTOCOUPLER	PC817B
Q001	TRANSISTOR	2SC3117-T
Q002	TRANSISTOR	2SA1249-T
Q003	TRANSISTOR	2SC3398-TA
Q004	TRANSISTOR	2SA1344-TA
Q005	TRANSISTOR	2SA1249-T
Q006	TRANSISTOR	2SA1344-TA
Q007	TRANSISTOR	2SC3117-T
Q008	TRANSISTOR	2SC3398-TA
Q009	TRANSISTOR	2SC2812-L7-TA
Q012	TRANSISTOR	2SC3398-TA
R001	RESISTOR(CERMET)	4.7KΩ 5% 1/8W
R002	RESISTOR(CERMET)	1KΩ 5% 1/8W
R003	RESISTOR(CERMET)	4.7KΩ 5% 1/8W
R004	RESISTOR(CERMET)	4.7KΩ 5% 1/8W
R005	RESISTOR(OXIDE)	820Ω 5% 2W
R006	RESISTOR(CERMET)	4.7KΩ 5% 1/8W
R007	RESISTOR(CERMET)	4.7KΩ 5% 1/8W
R008	RESISTOR(CERMET)	1KΩ 5% 1/8W
R009	RESISTOR(CERMET)	1.5KΩ 5% 1/4W
R010	RESISTOR(CERMET)	560Ω 5% 1/8W
R011	RESISTOR(CERMET)	560Ω 5% 1/8W
R012	RESISTOR(CERMET)	4.7KΩ 5% 1/8W
R013	RESISTOR(CERMET)	1KΩ 5% 1/8W
R014	RESISTOR(CERMET)	4.7KΩ 5% 1/8W
R015	RESISTOR(CERMET)	1.8KΩ 5% 1/4W
R016	RESISTOR(CERMET)	5.6KΩ 5% 1/4W
R017	RESISTOR(CERMET)	1KΩ 5% 1/4W
R018	RESISTOR(CERMET)	4.7KΩ 5% 1/8W
R019	RESISTOR(CERMET)	4.7KΩ 5% 1/8W
R020	RESISTOR(CERMET)	4.7KΩ 5% 1/8W
R021	RESISTOR(CERMET)	15KΩ 1% 1/10W
R028	RESISTOR(CERMET)	47KΩ 5% 1/8W
R029	RESISTOR(CERMET)	47KΩ 5% 1/8W
R030	RESISTOR(CERMET)	47KΩ 5% 1/8W
R031	RESISTOR(CERMET)	47KΩ 5% 1/8W
R032	RESISTOR(CERMET)	47KΩ 5% 1/8W
R033	RESISTOR(CERMET)	47KΩ 5% 1/8W
R034	RESISTOR(CERMET)	47KΩ 5% 1/8W
R035	RESISTOR(CERMET)	47KΩ 5% 1/8W
R036	RESISTOR(CERMET)	10KΩ 5% 1/8W
R037	RESISTOR(CERMET)	10KΩ 5% 1/8W
R039	RESISTOR(CERMET)	10KΩ 5% 1/4W
R040	RESISTOR(CERMET)	100KΩ 5% 1/8W
R041	RESISTOR(CERMET)	4.3KΩ 1% 1/10W
R042	RESISTOR(CERMET)	750Ω 1% 1/10W
R043	RESISTOR(CERMET)	33KΩ 1% 1/10W
R044	RESISTOR(CERMET)	4.7KΩ 1% 1/10W
R045	RESISTOR(CERMET)	4.7KΩ 1% 1/10W
R046	RESISTOR(CERMET)	10KΩ 1% 1/8W
R047	RESISTOR(CERMET)	68KΩ 1% 1/8W
R048	RESISTOR(CERMET)	33KΩ 1% 1/8W
R049	RESISTOR(CERMET)	15KΩ 1% 1/8W
R050	RESISTOR(CERMET)	2.4KΩ 1% 1/8W
R051	RESISTOR(CERMET)	10KΩ 1% 1/8W
R052	RESISTOR(CERMET)	100KΩ 1% 1/8W
R053	RESISTOR(CERMET)	24KΩ 1% 1/8W
R054	RESISTOR(CERMET)	5.6KΩ 1% 1/8W
R055	RESISTOR(CERMET)	2.4KΩ 1% 1/8W
R056	RESISTOR(CERMET)	10KΩ 1% 1/8W
R057	RESISTOR(CERMET)	68KΩ 1% 1/8W
R058	RESISTOR(CERMET)	33KΩ 1% 1/8W
R059	RESISTOR(CERMET)	16KΩ 1% 1/8W
R061	RESISTOR(CERMET)	10KΩ 5% 1/8W
R062	RESISTOR(CERMET)	10KΩ 5% 1/8W
R063	RESISTOR(CERMET)	47KΩ 5% 1/8W

SYMBOLS	DESCRIPTION	SPECIFICATIONS
R064	RESISTOR(CERMET)	4.7KΩ 5% 1/8W
R065	RESISTOR(CERMET)	5.6KΩ 5% 1/8W
R066	RESISTOR(CERMET)	3.3KΩ 5% 1/8W
R067	RESISTOR(CERMET)	3.3KΩ 5% 1/8W
R068	RESISTOR(CERMET)	1KΩ 5% 1/4W
R069	RESISTOR(CERMET)	1KΩ 5% 1/4W
R071	RESISTOR(CERMET)	10KΩ 5% 1/8W
R072	RESISTOR(CERMET)	560Ω 5% 1/8W
R073	RESISTOR(OXIDE)	120KΩ 5% 2W
R074	RESISTOR(OXIDE)	120KΩ 5% 2W
R079	RESISTOR(OXIDE)	1KΩ 5% 1W
R080	RESISTOR(CERMET)	10KΩ 5% 1/8W
R081	RESISTOR(CERMET)	10KΩ 5% 1/8W
R082	RESISTOR(CERMET)	10KΩ 5% 1/8W
R083	RESISTOR(CERMET)	10KΩ 5% 1/8W
R085	RESISTOR(OXIDE)	3.3KΩ 5% 2W
RY001	RELAY	G2R-1-12V
RY002	RELAY	G2R-1-12V
RY003	RELAY	G2R-1-12V
RY006	RELAY	GVE-12HME-K
RY008	RELAY	GVE-12HME-K
RY009	RELAY	GVE-12HME-K
RY010	RELAY	GVE-12HME-K
RY011	RELAY	GVE-12HME-K
RY012	RELAY	G2R-1-12V
S001	SWITCH	SSSU12
S002	SWITCH	SSSGM14
S003	SWITCH	SJKS1120-0404
S004	SWITCH	SSSGM23
S005	SWITCH	SKDS10-412
S006	SWITCH	SRRQVA.S
TH002	THERMISTOR	H02AR181M265
TH003	THERMISTOR	H61G06AR150M
VA001	VARISTOR	ERZC14DK681W
X001	CRYSTAL	AT-51-10M

3-4 Electric Wiring Diagram, Outdoor Unit

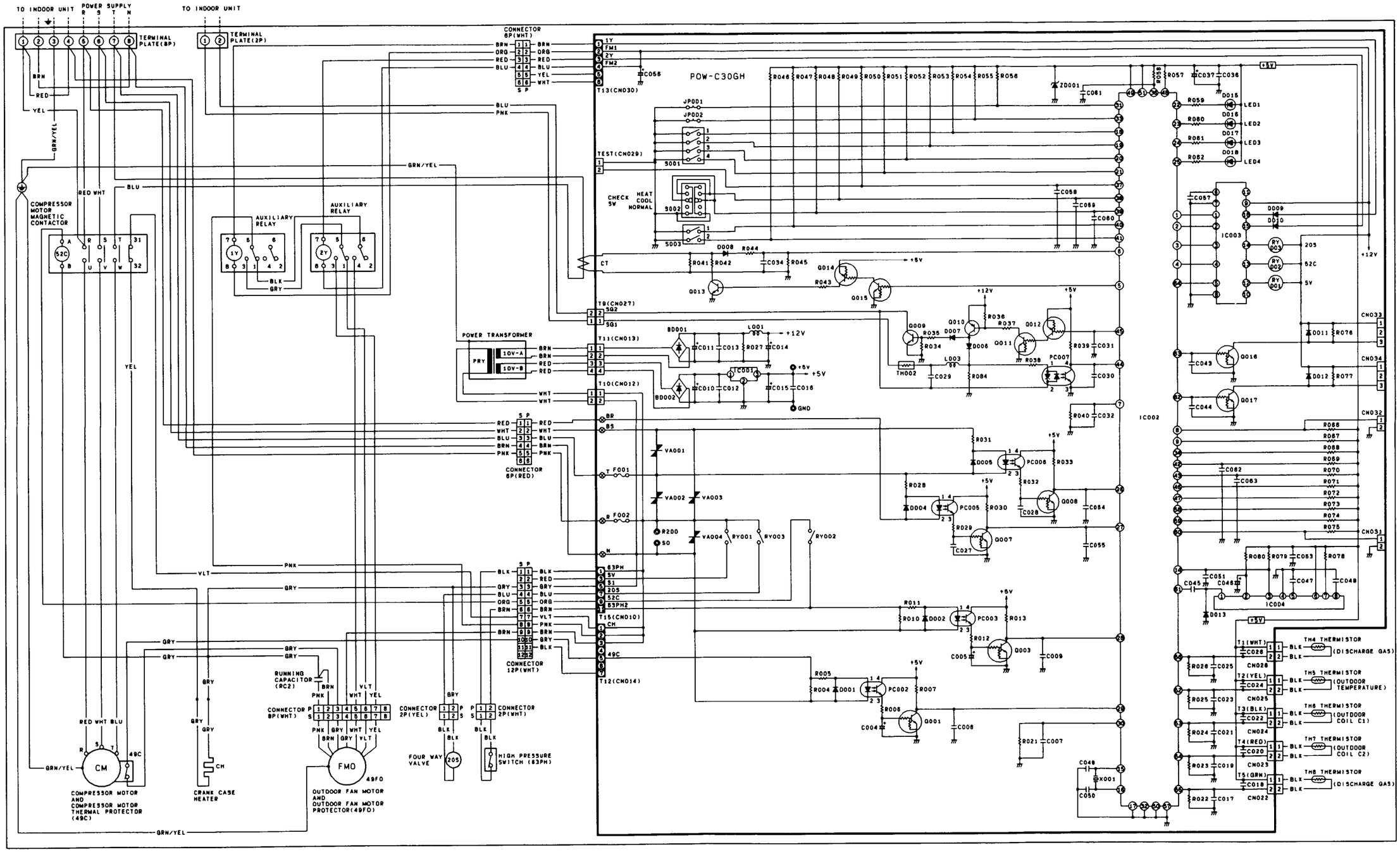


Fig. 28

SM700064

3-5 Outdoor Unit P.C.B. Ass'y Component List (POW-30CH)

SYMBOLS	DESCRIPTION	SPECIFICATIONS
B006	COMPOSITE P.	B250AC103100
C004	CAPACITOR	4.7μF 20% 50V
C005	CAPACITOR	4.7μF 20% 50V
C007	CAPACITOR	0.01μF 25V
C008	CAPACITOR	0.01μF 25V
C009	CAPACITOR	0.01μF 25V
C010	CAPACITOR	1000μF 20% 25V
C011	CAPACITOR	2200μF 20% 25V
C012	CAPACITOR	0.022μF 25V
C013	CAPACITOR	0.022μF 25V
C014	CAPACITOR	100μF 20% 25V
C015	CAPACITOR	220μF 20% 16V
C016	CAPACITOR	0.022μF 25V
C017	CAPACITOR	0.047μF 50V
C018	CAPACITOR	0.022μF 25V
C019	CAPACITOR	0.047μF 50V
C020	CAPACITOR	0.022μF 25V
C021	CAPACITOR	0.047μF 50V
C022	CAPACITOR	0.022μF 25V
C023	CAPACITOR	0.047μF 50V
C024	CAPACITOR	0.022μF 25V
C025	CAPACITOR	0.047μF 50V
C026	CAPACITOR	0.022μF 25V
C027	CAPACITOR	0.01μF 25V
C028	CAPACITOR	0.01μF 25V
C029	CAPACITOR	0.01μF 250V
C030	CAPACITOR	0.001μF 10% 50V
C031	CAPACITOR	0.001μF 10% 50V
C032	CAPACITOR	0.047μF 50V
C034	CAPACITOR	100μF 20% 16V
C035	CAPACITOR	0.01μF 25V
C036	CAPACITOR	0.022μF 25V
C037	CAPACITOR	100μF 20% 16V
C043	CAPACITOR	0.01μF 25V
C044	CAPACITOR	0.01μF 25V
C045	CAPACITOR	0.047μF 50V
C046	CAPACITOR	10μF 20% 50V
C047	CAPACITOR	0.001μF 10% 50V
C048	CAPACITOR	0.001μF 10% 50V
C049	CAPACITOR	15PF 5% 50V
C050	CAPACITOR	15PF 5% 50V
C051	CAPACITOR	0.01μF 25V
C053	CAPACITOR	0.01μF 25V
C054	CAPACITOR	0.01μF 25V
C055	CAPACITOR	0.01μF 25V
C056	CAPACITOR	4.7μF 20% 25V
C057	CAPACITOR	0.01μF 50V
C058	CAPACITOR	0.047μF 50V
C059	CAPACITOR	0.047μF 50V
C060	CAPACITOR	0.047μF 50V
C061	CAPACITOR	0.047μF 50V
C062	CAPACITOR	0.047μF 50V
C063	CAPACITOR	0.047μF 50V
CN002	CONNECTOR	JBP-B
CN003	CONNECTOR	JBP-B
CN012	CONNECTOR	J5289-2A-WH
CN013	CONNECTOR	J8263B-0402-W
CN015	CONNECTOR	JBP-B
CN021	CONNECTOR	JBP-B
CN022	CONNECTOR	J8263B-0202-G
CN023	CONNECTOR	J8263B-0202-R
CN024	CONNECTOR	J8263B-0202-W
CN025	CONNECTOR	J8263B-0202-Y
CN026	CONNECTOR	J8263B-0202-W
CN027	CONNECTOR	J8263B-0202-B
CN029	CONNECTOR	JSB2P-HVQ-CA.-R
CN031	CONNECTOR	JSB2P-HVQ-CA.-B
CN032	CONNECTOR	JSB2P-HVQ-CA.-
CN033	CONNECTOR	J8263B-0302-K
CN034	CONNECTOR	J8263B-0302-R

SYMBOLS	DESCRIPTION	SPECIFICATIONS
D001	DIODE	GMA01
D002	DIODE	GMA01
D004	DIODE	GMA01
D005	DIODE	GMA01
D006	DIODE	DSK10E-BT
D007	DIODE	DSK10E-BT
D008	DIODE	SB007-03SPA
D009	DIODE	GMA01
D010	DIODE	GMA01
D011	DIODE	GMA01
D012	DIODE	GMA01
D013	DIODE	GMA01
D015	DIODE	SLP-181B
D016	DIODE	SLP-181B
D017	DIODE	SLP-181B
D018	DIODE	SLP-181B
BD001	BRIDGE DIODE	DBA10C
BD002	BRIDGE DIODE	DBA20C
F001	FUSE	250V 5A
F002	FUSE	250V 5A
IC001	IC	L7805ML
IC002	IC	UPD78214CW
IC003	IC	LB1233
IC004	IC	M5295L
JP001	JUMPER	JP05B
JP002	JUMPER	JP05B
L001	COIL	LEL0909-101K
L003	COIL	LEL0909-101K
PC002	PHOTOCOUPLER	PC817B
PC003	PHOTOCOUPLER	PC817B
PC005	PHOTOCOUPLER	PC817B
PC006	PHOTOCOUPLER	PC817B
PC007	PHOTOCOUPLER	PC814A
Q001	TRANSISTOR	2SC3402
Q003	TRANSISTOR	2SC3402
Q007	TRANSISTOR	2SC3402
Q008	TRANSISTOR	2SC3402
Q009	TRANSISTOR	2SC3117-T
Q010	TRANSISTOR	2SA1249-T
Q011	TRANSISTOR	2SC3402
Q012	TRANSISTOR	2SA1423
Q013	TRANSISTOR	2SC536F
Q014	TRANSISTOR	2SA1423
Q015	TRANSISTOR	2SC3402
Q016	TRANSISTOR	2SC3402
Q017	TRANSISTOR	2SC3402
R004	RESISTOR(OXIDE)	120KΩ 5% 2W
R005	RESISTOR(OXIDE)	120KΩ 5% 2W
R006	RESISTOR(CARBON)	560Ω 5% 1/4W
R007	RESISTOR(CARBON)	10KΩ 5% 1/4W
R010	RESISTOR(OXIDE)	120KΩ 5% 2W
R011	RESISTOR(OXIDE)	120KΩ 5% 2W
R012	RESISTOR(CARBON)	560Ω 5% 1/4W
R013	RESISTOR(CARBON)	10KΩ 5% 1/4W
R021	RESISTOR(CARBON)	39KΩ 5% 1/4W
R022	RESISTOR(METAL)	4.3KΩ 1% 1/4W
R023	RESISTOR(METAL)	4.7KΩ 1% 1/4W
R024	RESISTOR(METAL)	4.7KΩ 1% 1/4W
R025	RESISTOR(METAL)	4.7KΩ 1% 1/4W
R026	RESISTOR(METAL)	4.3KΩ 1% 1/4W
R027	RESISTOR(CARBON)	10KΩ 5% 1/4W
R028	RESISTOR(OXIDE)	300KΩ 5% 2W
R029	RESISTOR(CARBON)	560Ω 5% 1/4W
R030	RESISTOR(CARBON)	10KΩ 5% 1/4W
R031	RESISTOR(OXIDE)	300KΩ 5% 2W
R032	RESISTOR(CARBON)	560Ω 5% 1/4W
R033	RESISTOR(CARBON)	10KΩ 5% 1/4W
R034	RESISTOR(CARBON)	1KΩ 5% 1/4W
R035	RESISTOR(CARBON)	2.2KΩ 5% 1/4W
R036	RESISTOR(CARBON)	2.2KΩ 5% 1/4W

SYMBOLS	DESCRIPTION	SPECIFICATIONS
R037	RESISTOR(CARBON)	2.2KΩ 5% 1/4W
R038	RESISTOR(OXIDE)	1KΩ 5% 2W
R039	RESISTOR(CARBON)	10KΩ 5% 1/4W
R040	RESISTOR(METAL)	4.3KΩ 1% 1/4W
R041	RESISTOR(METAL)	1.6KΩ 1% 1/4W
R042	RESISTOR(METAL)	560Ω 1% 1/4W
R043	RESISTOR(CARBON)	1KΩ 5% 1/4W
R044	RESISTOR(CARBON)	1KΩ 5% 1/4W
R045	RESISTOR(CARBON)	47KΩ 5% 1/4W
R046	RESISTOR(CARBON)	10KΩ 5% 1/4W
R047	RESISTOR(CARBON)	10KΩ 5% 1/4W
R048	RESISTOR(CARBON)	10KΩ 5% 1/4W
R049	RESISTOR(CARBON)	10KΩ 5% 1/4W
R050	RESISTOR(CARBON)	10KΩ 5% 1/4W
R051	RESISTOR(CARBON)	10KΩ 5% 1/4W
R052	RESISTOR(CARBON)	10KΩ 5% 1/4W
R053	RESISTOR(CARBON)	10KΩ 5% 1/4W
R054	RESISTOR(CARBON)	10KΩ 5% 1/4W
R055	RESISTOR(CARBON)	10KΩ 5% 1/4W
R056	RESISTOR(CARBON)	10KΩ 5% 1/4W
R057	RESISTOR(CARBON)	10KΩ 5% 1/4W
R058	RESISTOR(CARBON)	10KΩ 5% 1/4W
R059	RESISTOR(CARBON)	560Ω 5% 1/4W
R060	RESISTOR(CARBON)	560Ω 5% 1/4W
R061	RESISTOR(CARBON)	560Ω 5% 1/4W
R062	RESISTOR(CARBON)	560Ω 5% 1/4W
R066	RESISTOR(CARBON)	10KΩ 5% 1/4W
R067	RESISTOR(CARBON)	10KΩ 5% 1/4W
R068	RESISTOR(CARBON)	10KΩ 5% 1/4W
R069	RESISTOR(CARBON)	10KΩ 5% 1/4W
R070	RESISTOR(CARBON)	10KΩ 5% 1/4W
R071	RESISTOR(CARBON)	10KΩ 5% 1/4W
R072	RESISTOR(CARBON)	10KΩ 5% 1/4W
R073	RESISTOR(CARBON)	10KΩ 5% 1/4W
R074	RESISTOR(CARBON)	10KΩ 5% 1/4W
R075	RESISTOR(CARBON)	10KΩ 5% 1/4W
R076	RESISTOR(CARBON)	10KΩ 5% 1/4W
R077	RESISTOR(CARBON)	10KΩ 5% 1/4W
R078	RESISTOR(CARBON)	4.7KΩ 5% 1/4W
R079	RESISTOR(CARBON)	4.7KΩ 5% 1/4W
R080	RESISTOR(CARBON)	15KΩ 5% 1/4W
R084	RESISTOR(OXIDE)	3.3KΩ 5% 2W
RY001	RELAY	GVE-12HME-K
RY002	RELAY	GVE-12HME-K
RY003	RELAY	GVE-12HME-K
S001	SWITCH	SJKS1120-4-4
S002	SWITCH	SSSSU12-3
S003	SWITCH	SSSGM22
T001	TRANS	CT422920S-30
TH002	THERMISTOR	HPTH59H02AR1.8
VA001	VARISTOR	ERZC14DK821W
VA002	VARISTOR	ERZC14DK821W
VA003	VARISTOR	ERZC14DK821W
VA004	VARISTOR	ERZC14DK681W
X001	CRYSTAL	XAT-51-10M
ZD1001	ZENER DIODE	GZS6.2Y-BT

4. SERVICE PROCEDURES

NOTE

As for the above 3 items preceded by *, refer to Electric Wiring Diagrams in Fig. 27 and Fig. 28.

4-1 Troubleshooting

This section explains:

- ❑ What the LED codes mean
- ❑ What the remote control unit display screen messages mean
- ❑ How to use the flow charts to find and solve problems
- ❑ How to use the self-diagnostic tests to find parts that aren't working right

This unit is made to be trouble free, and not need much service. However, with time, moving parts wear out, electronic components break down, and sometimes misuse damages the unit.
The purpose of this section is to help you when the unit is not working properly. Sometimes your experience will tell you right away where to look for a problem, and when you find it you will know how to fix it at once.
Often, however, all you have is a *symptom* like "poor cooling" or "outside fan doesn't come on." Now you must find out the cause of the problem, and then how to fix it. This section provides several ways to help you go from the symptom to the cause and then the solution.
The first chart, **General Troubleshooting Flow Chart** is divided into two sections: Poor heating and Poor Cooling. Under each heading you will find the main things that can go wrong and cause either of these problems. Sometimes you can start with this chart and find the problem right away, but often you will come here for more suggestions after you have looked at the error code on the remote control unit display. This chart gives you the "big picture" of problems and solutions.
The other main tool we explain here is the use of the **Alarm Messages**. When a certain part fails or a safety device has shut the unit down, any alpha-numeric codes appears on the display to guide you to the problem.
By understanding the code you can often go right to the problem area and then, with this manual and your knowledge of air conditioning, find the solution.

Sections (3) and (4) explain what each the code means. **Section (5)** explains in detail on how to deal with the problem when the Alarm Message appeared on the display. Read this section together with either "3-2 Electric Wiring Diagram, Indoor Unit" or "3-4 Electric Wiring Diagram, Outdoor Unit". Once you know this information, you go to Section (6), where flow charts take you from the *general* problem to a *specific* solution. For each step the flow chart gives you a *specific* procedure, and then depending on the results of the procedure, directs you to the next step until the *exact* problem is found and solved. **You will use these three sections often.**

Section (6) Procedures for When a Specific Component Does Not Work at all gives you specific procedures to find and solve Problems when you have found a part not working either from direct observation or from the Alarm Message. **This section is also used often.**

Finally, **Section (7)** tells you how to use the control panel to find out what the past 4 problems have been with this unit, and how to use the remote control unit to check the temperature of each main area where a thermistor is located.

(1) Check before and after Troubleshooting

Many problems may happen because of wiring or power supply problems, so you should check these areas first. Problems here can cause false results in some of the other tests, and so should be corrected first.

①. Check power supply wiring

- ❑ Check that power supply wires are correctly connected to terminal No. 5 through No. 8 on the 8P terminal plate in the outdoor unit.
- ❑ Check the power supply wires are correctly connected between terminal No. 1 and 2 on the 3P terminal plate in the indoor unit and terminal No. 1 and 2 on the 8P terminal plate in the outdoor unit.

②. Check inter-unit wiring

- ❑ Check that inter-unit control wiring (DC low voltage) is correctly connected between the indoor unit and outdoor unit.

Power Supply: 50 Hz, 3-phase, 380/400/415V

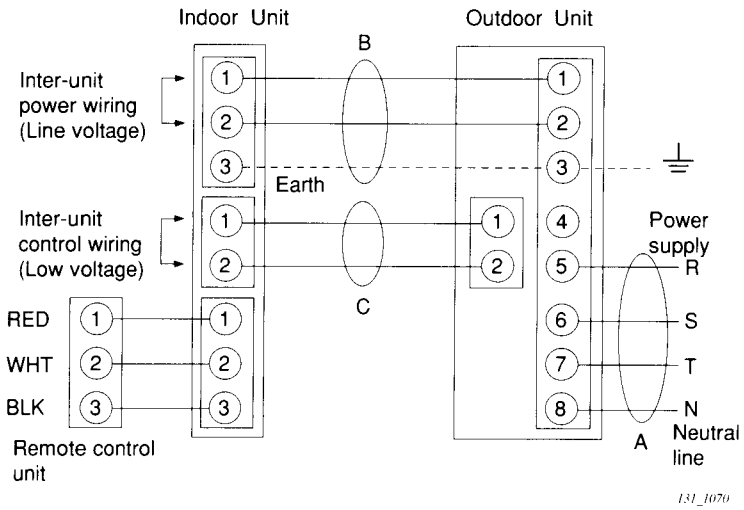


Fig. 29

③. Check power supply

- ❑ Check that voltage is within the specified range (±10% of the rating).
- ❑ Check that power is being supplied.

WARNING

If the following troubleshooting must be done with power being supplied, be careful about any uninsulated live part that can cause ELECTRIC SHOCK.

④. Check the lead wires and connectors in indoor and outdoor units.

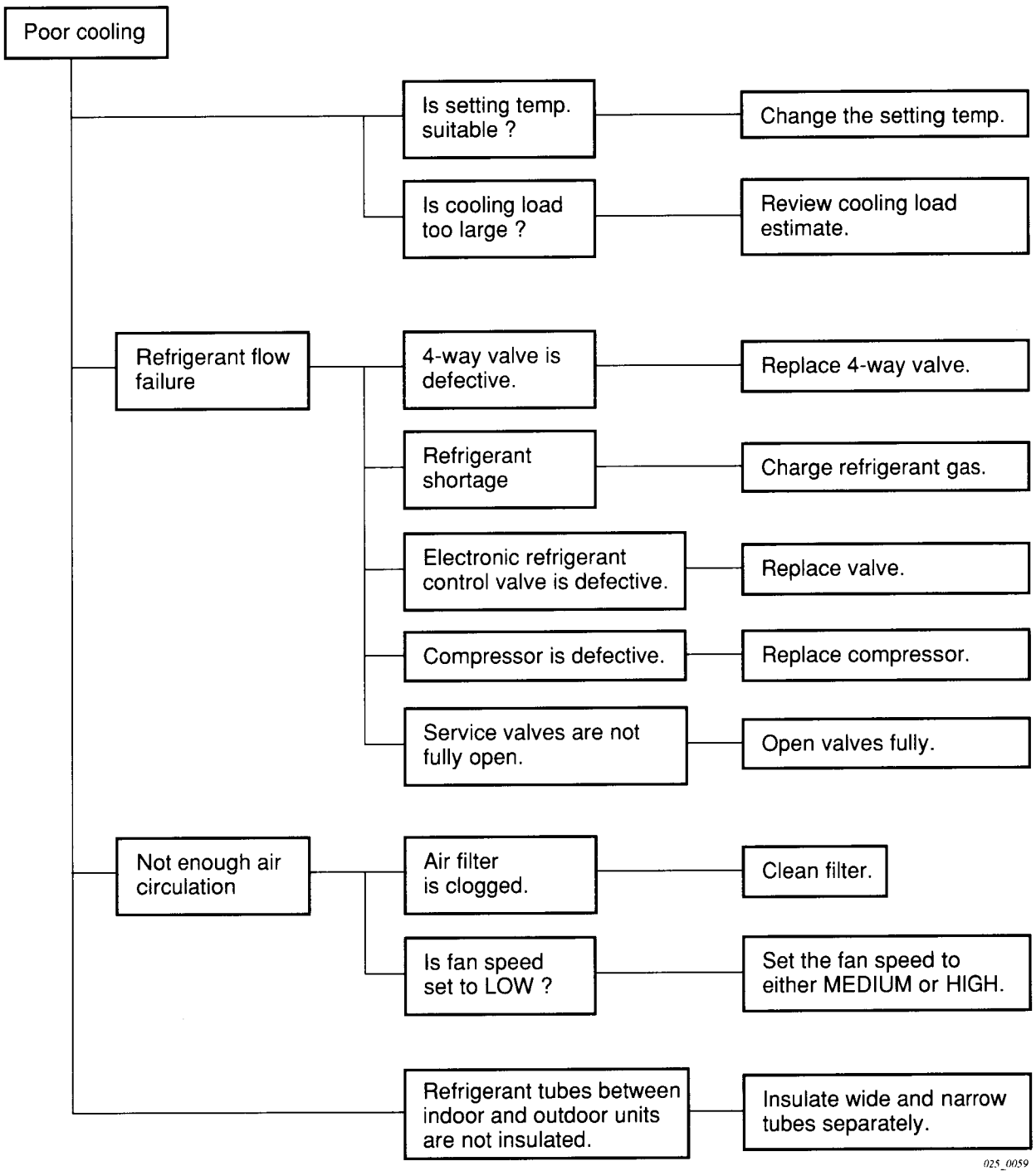
- ❑ Check that the coating of lead wires is not damaged.
- ❑ Check that lead wires are firmly connected at the terminal plate.
- ❑ Check that wiring is correct.

(2) General Troubleshooting Flow Chart: Diagnosis and Remedy

When you have found a major problem, such as refrigerant not flowing in the system or reduced air circulation, come to this section and find the box listing the problem. Connected to the box are the main causes of the problem and their remedies. To find out which malfunction is happening in your case, check the remote control unit for an Alarm Message, and follow the steps in section 4).

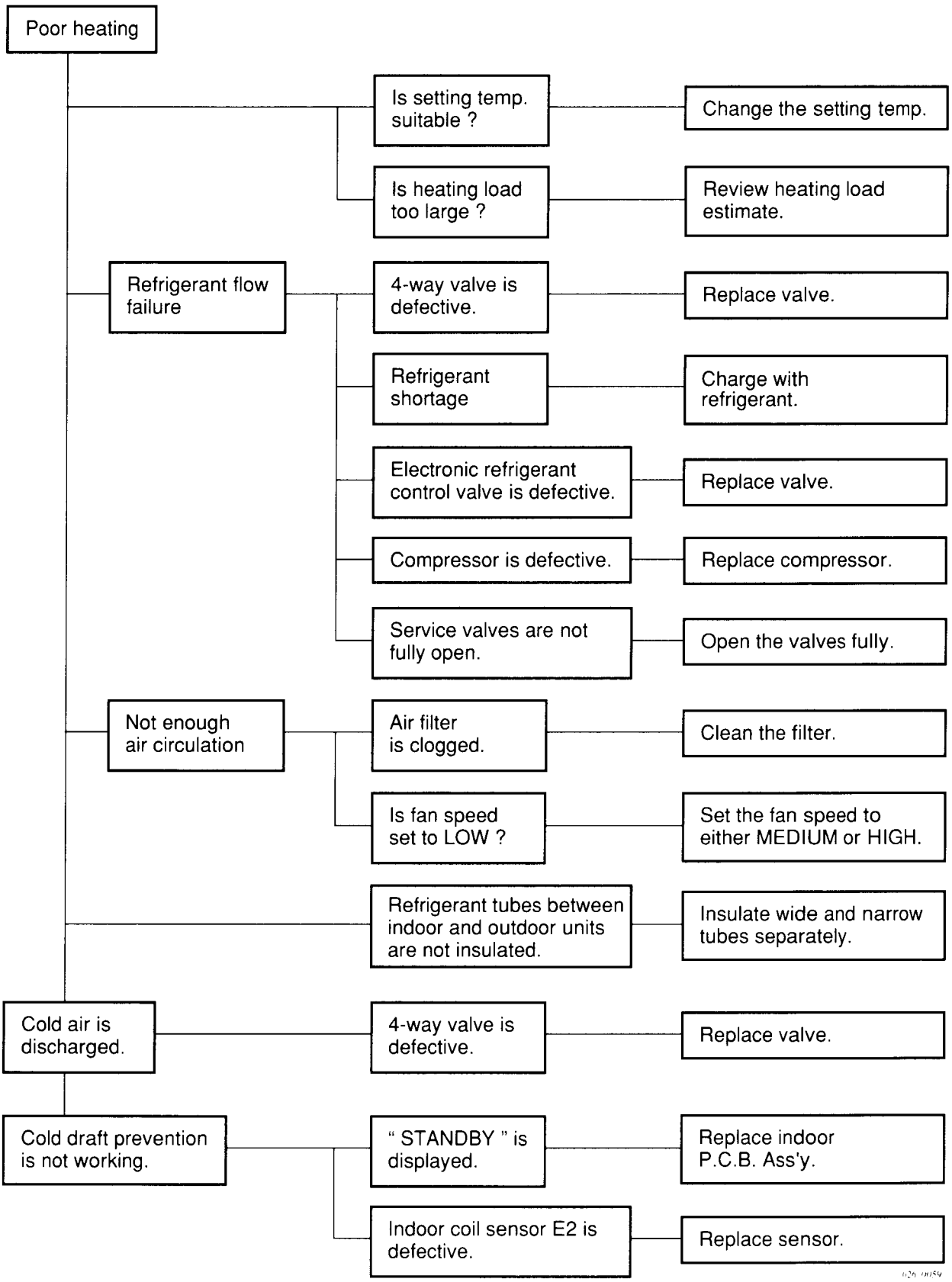
(A) Cooling

a. Cooling



(B) Heating

b. Heating



4

(3) Meanings of the Remote Control Unit Alarm Messages

This table gives each Alarm Message, its meaning and the specific cause. To find the exact repair procedure go to section 6), find the page with the Alarm Message, and follow the diagnosis procedure.

Possible cause of trouble			Alarm message
When there is no alarm message.			E0
*Serial Communication Errors (SCR)	Remote Control Unit is detecting abnormal signal from indoor unit.	Error receiving of serial communications signal.	E1
		Error transmitting serial communications signal.	E2
	Indoor unit is detecting abnormal signal from the remote control unit.	Error receiving serial communications signal.	E3
	Indoor unit is detecting abnormal signal from outdoor unit.(outdoor unit is abnormal)	Error receiving serial communications signal.	E4
		Error transmitting serial communications signal.	E5
	Outdoor unit is detecting abnormal signal from indoor unit.(indoor unit is abnormal)	Error receiving serial communications signal.	E6
		Error transmitting serial communications signal.	E7
Activation of Protective device	Protective device in indoor unit is activated.	• Thermal protector in indoor fan motor is activated.	P1
	Protective device in outdoor unit is activated.	• Thermal protector in outdoor fan motor is activated. • Compressor thermal protector is activated.	P2
		• Discharge gas temperature is abnormal.	P3
		• High pressure switch is activated.	P4
		• Negative phase protector is activated.	P5
		• Wrong model combination between indoor and outdoor unit.	P6
Thermistor failure	Indoor thermistor is either open-circuited or damaged.	• Indoor coil temp. (E1 = TH1) cannot be detected.	F1
		• Indoor coil temp. (E1 = TH2) cannot be detected.	F2
	Outdoor thermistor is either open-circuited or damaged.	• Discharge gas temp. (TH8) cannot be detected during COOLING operation.	F4
		• Discharge gas temp. (TH4) cannot be detected during HEATING operation.	F5
		• Outdoor coil temp. (C1 = TH6) cannot be detected.	F6
		• Outdoor coil temp. (C2 = TH7) cannot be detected.	F7
		• Outdoor air temp. (TH5) cannot be detected.	F8
Fault with Compressor and its Circuit	Protective device for compressor is activated.	• Compressor motor is overloaded.	H1
		• Compressor motor is locked.	H2
		• Compressor current detection circuit is abnormal.	H3
• Either a crossed wiring or tubing between the indoor and outdoor unit is detected.			H7

NOTE

The serial communication errors (*) are errors in the control signal which goes between the outdoor and indoor units or between the Remote Control Unit and Indoor unit.

(4) LED Indication on the Outdoor Unit's P.C.B. Ass'y

If something goes wrong with the outdoor unit, **LED** lamps on the **outdoor P.C.B. Ass'y** light up to show the cause of the trouble, in addition to the Alarm message on the remote control unit.

LED 4	LED 3	LED 2	LED 1	Alarm (*) message	Possible cause of trouble
●	●	●	●	–	Normal operation.
●	●	●	☼	No Display	Refrigerant shortage.*
●	●	☼	●	E6	Recieving fault of serial signal.
●	●	☼	☼	E7	Transmitting fault of serial signal.
●	☼	●	●	P2	Thermal protector either in outdoor fan motor or compressor is working.
●	☼	●	☼	P3	Discharge gas temperature is abnormal.
●	☼	☼	●	P4	High pressure switch is working.
●	☼	☼	☼	P5	Negative phase protector is working.
☼	●	●	●	P6	Wrong model combination between indoor and outdoor unit.
☼	●	●	☼	H1	Compressor motor is overloaded.
☼	●	☼	●	H2	Compressor motor is locked.
☼	●	☼	☼	H3	Compressor current detection circuit is abnormal.
☼	☼	☼	☼	F4 – F9	Thermistor in outdoor unit is either open-circuited or short-circuited.

NOTE ☼ . . . . LED lamps ON (lights up) ● . . . . LED lamps OFF

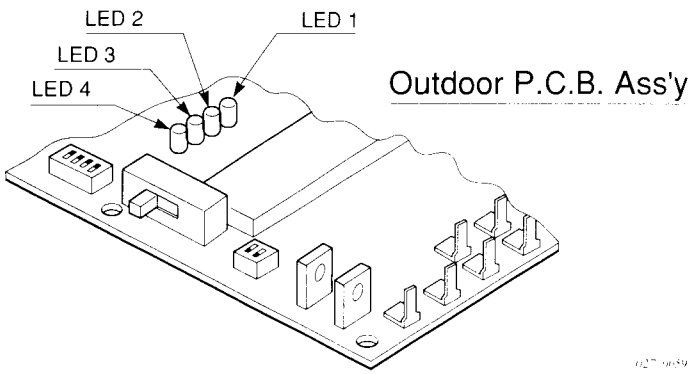


Fig. 30

CAUTION

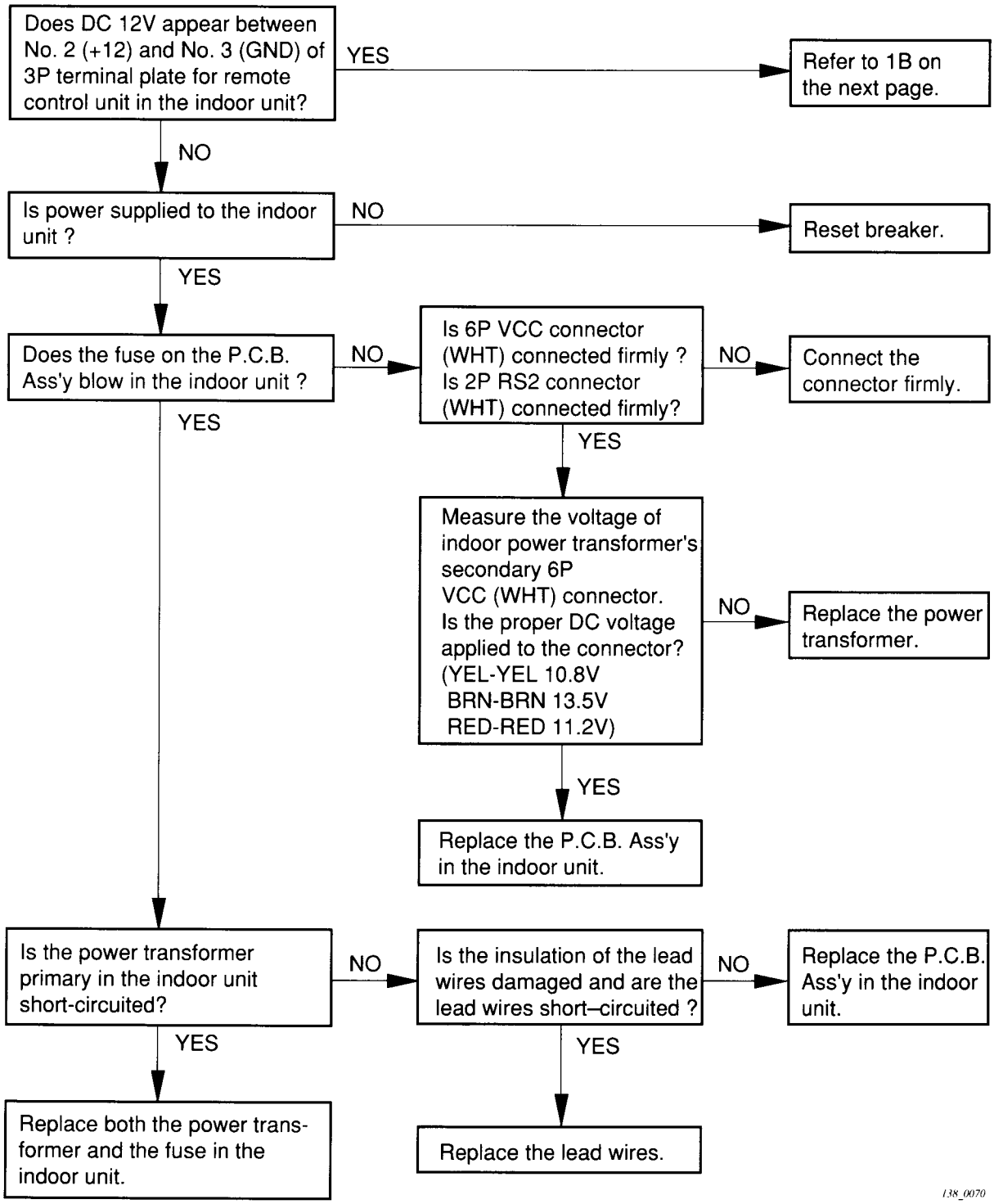
* **REFRIGERANT SHORTAGE**
Note particularly that a **shortage of refrigerant** is only shown by the **outdoor P.C.B. Ass'y LEDs** and the Alarm Message does not appear on the Indoor Remote Control Unit. The compressor keeps running even when the refrigerant is less, so when you find the LED indication on the **outdoor P.C.B. Ass'y**, stop the air conditioner immediately to avoid the compressor damage.

(5) What to Do for Each Alarm Message

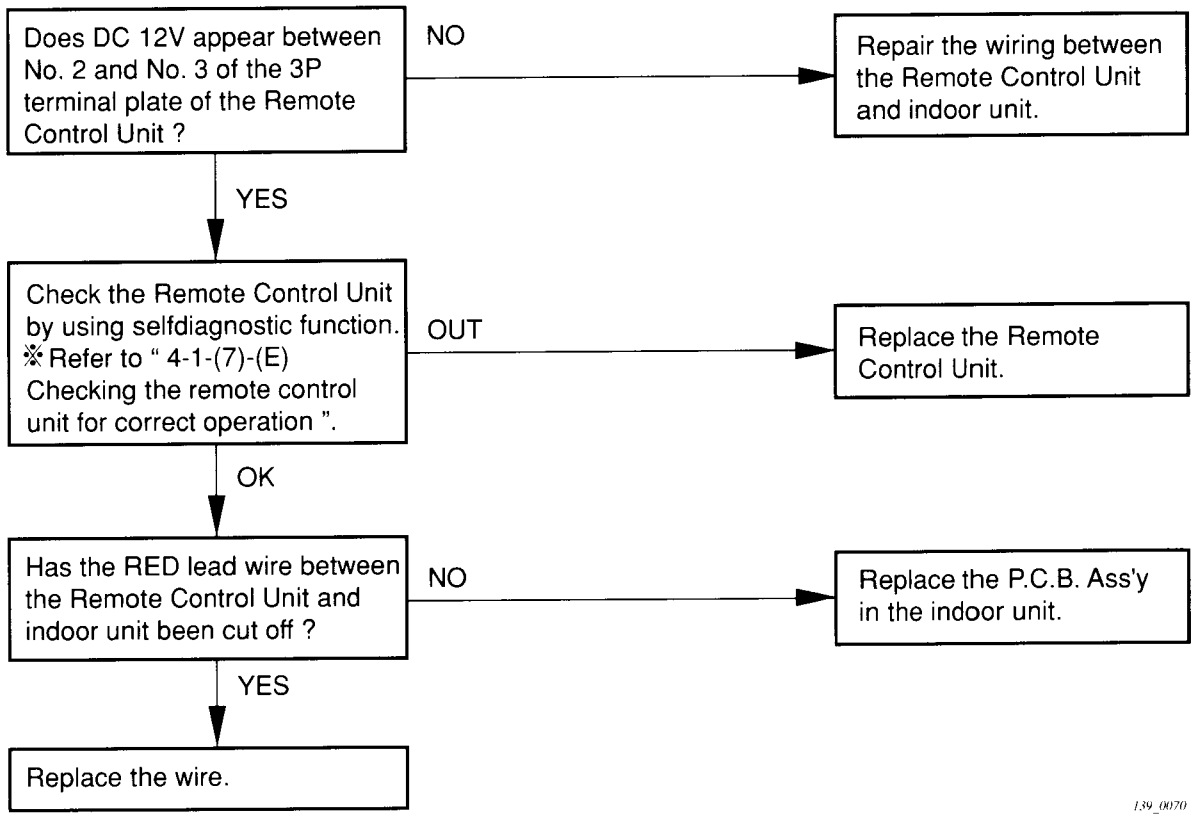
This section gives a procedure to track down and fix most air conditioner problems. For each Alarm Message that might appear on the remote control unit when a problem happens, you have a specific procedure to follow.
There are 13 Alarm categories explained, and some have two sets of procedures, (A) and (B), which may take up two different pages.

①. Nothing is displayed on the remote control unit and the air conditioner does not operate.

1 – (A)



1 – (B)



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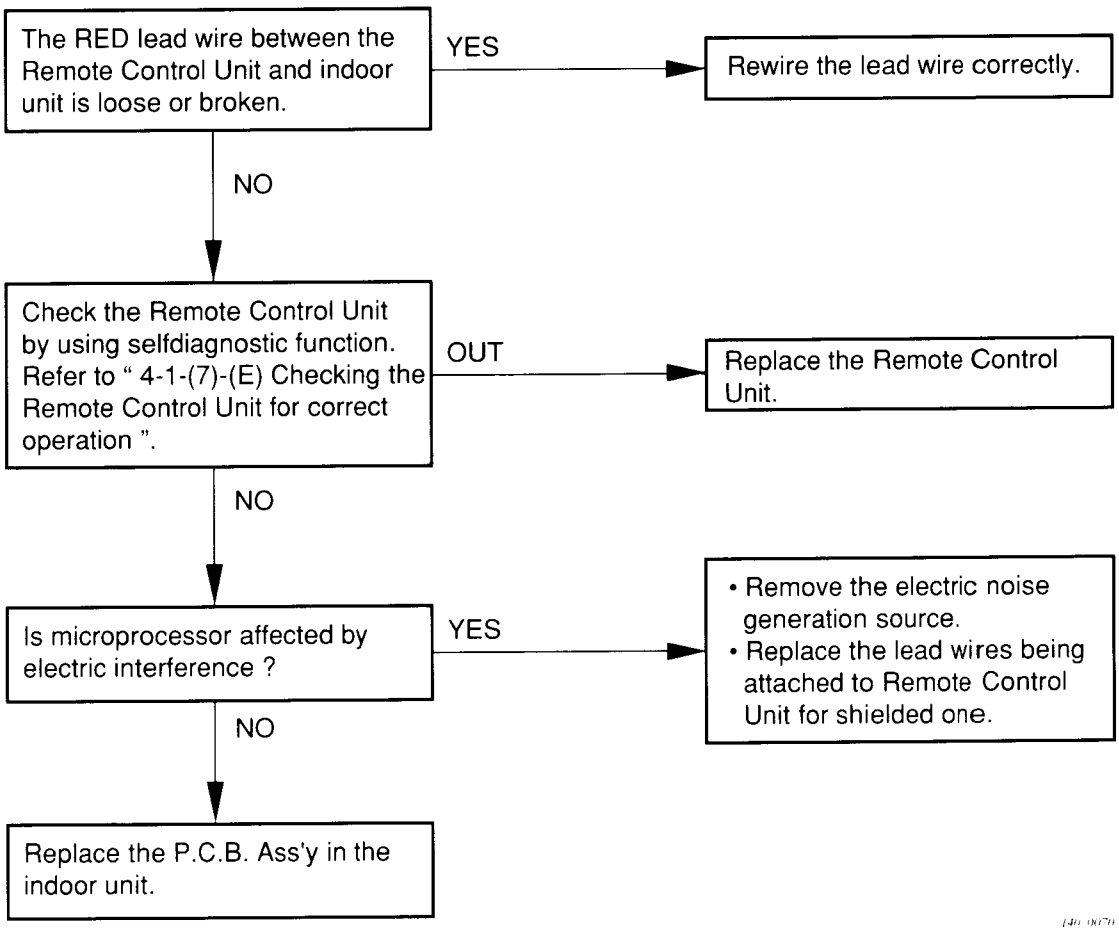
4

②. "CHECK" and "E1", "E2" or "E3" are displayed on the CONTROL PANEL.



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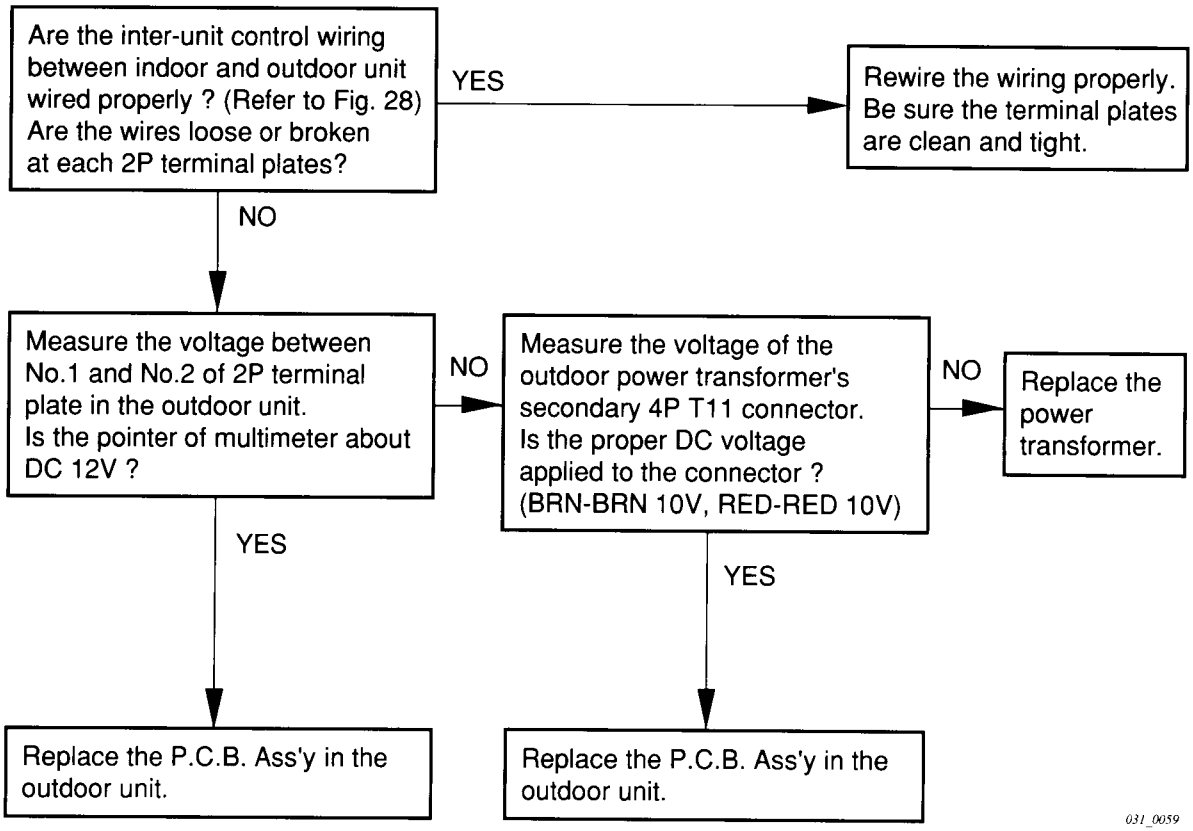
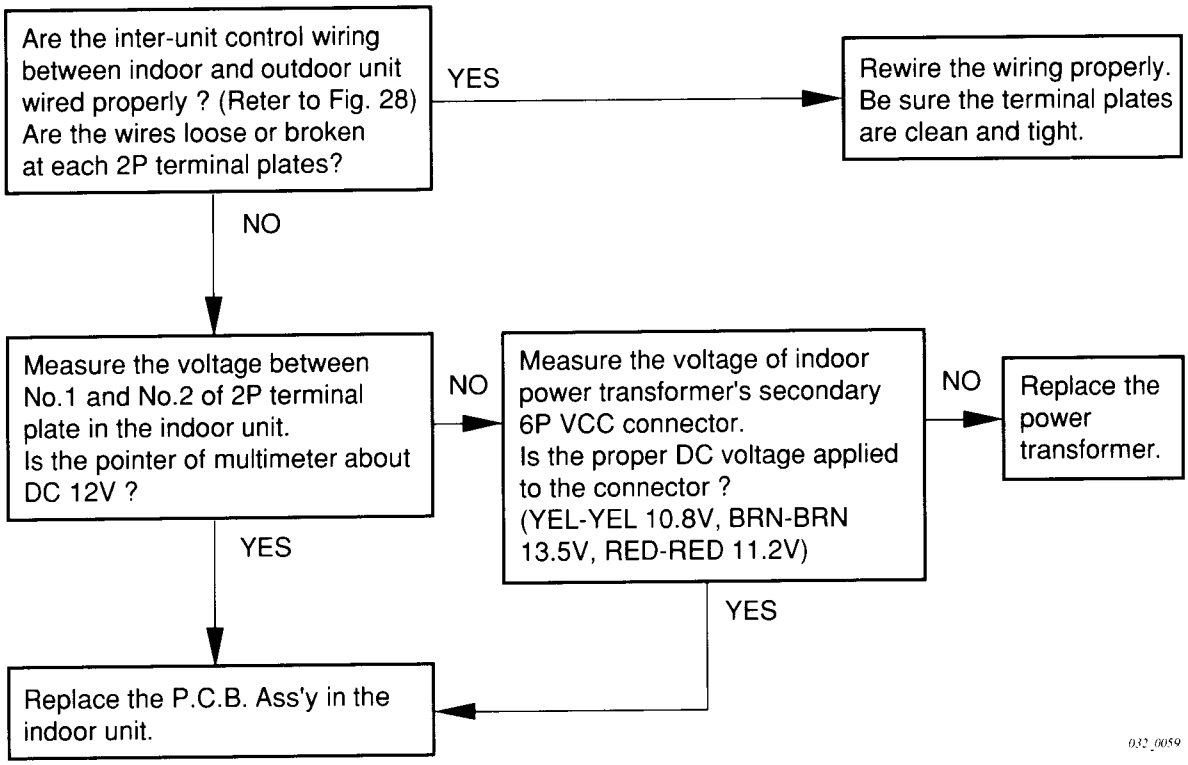
③. CHECK and E4 are displayed on the remote control unit.



④. CHECK and E5 are displayed on the remote control unit.

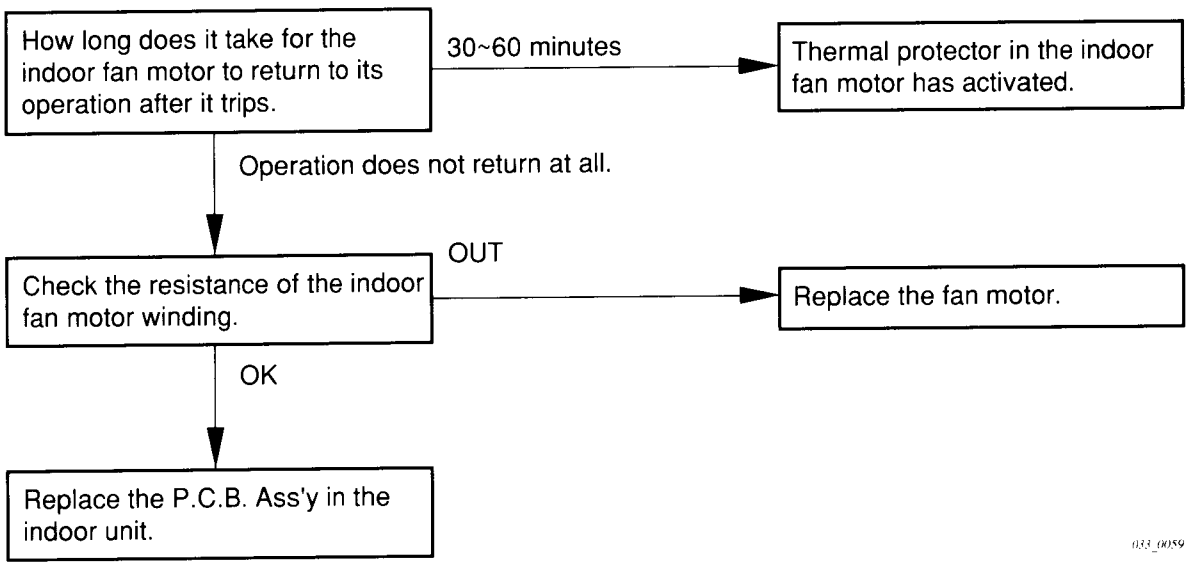
- ❑ Powerful electric noise biased in the inter-unit control wiring, or there is a possibility of signal interruption, or loose or corroded connections in the inter-unit control wiring.
  - To fix this problem, try to remove the source of electrical noise, and /or clean the connections. Make sure the terminal connections are securely tightened.
- ❑ Broken and nearly broken control wires can also cause this Alarm Message, so carefully check the wires for physical damage, and replace as necessary.

⑤. CHECK and E6 are displayed on the remote control unit.



4

⑥. CHECK and P1 are displayed on the remote control unit.



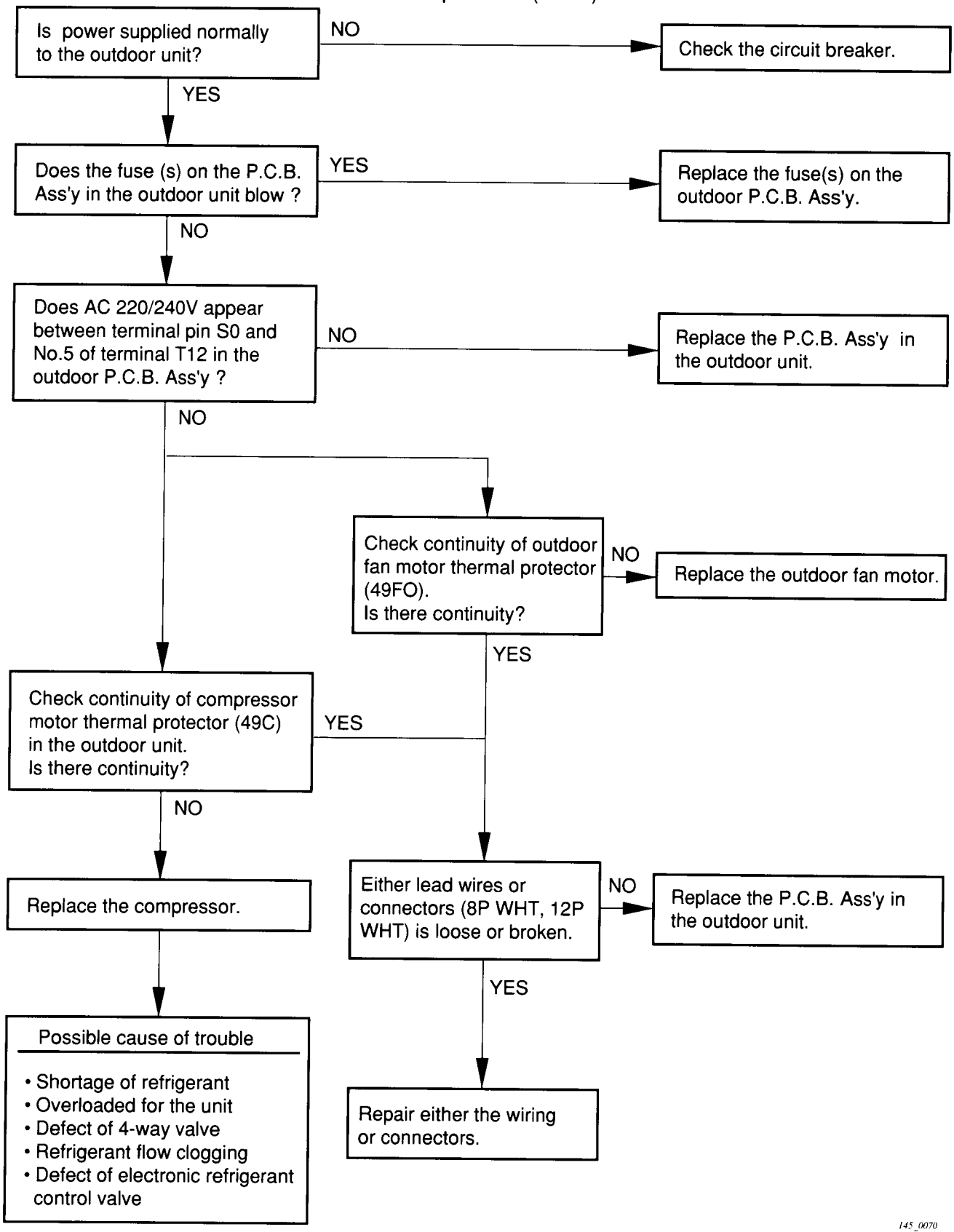
❑ A Protective device in the indoor unit has opened the circuit.

- Indoor fan motor thermal protector (49 FI).

⑦. CHECK and P2 are displayed on the remote control unit.

❑ Protective device(s) in the outdoor unit has opened the circuit. The two devices are:

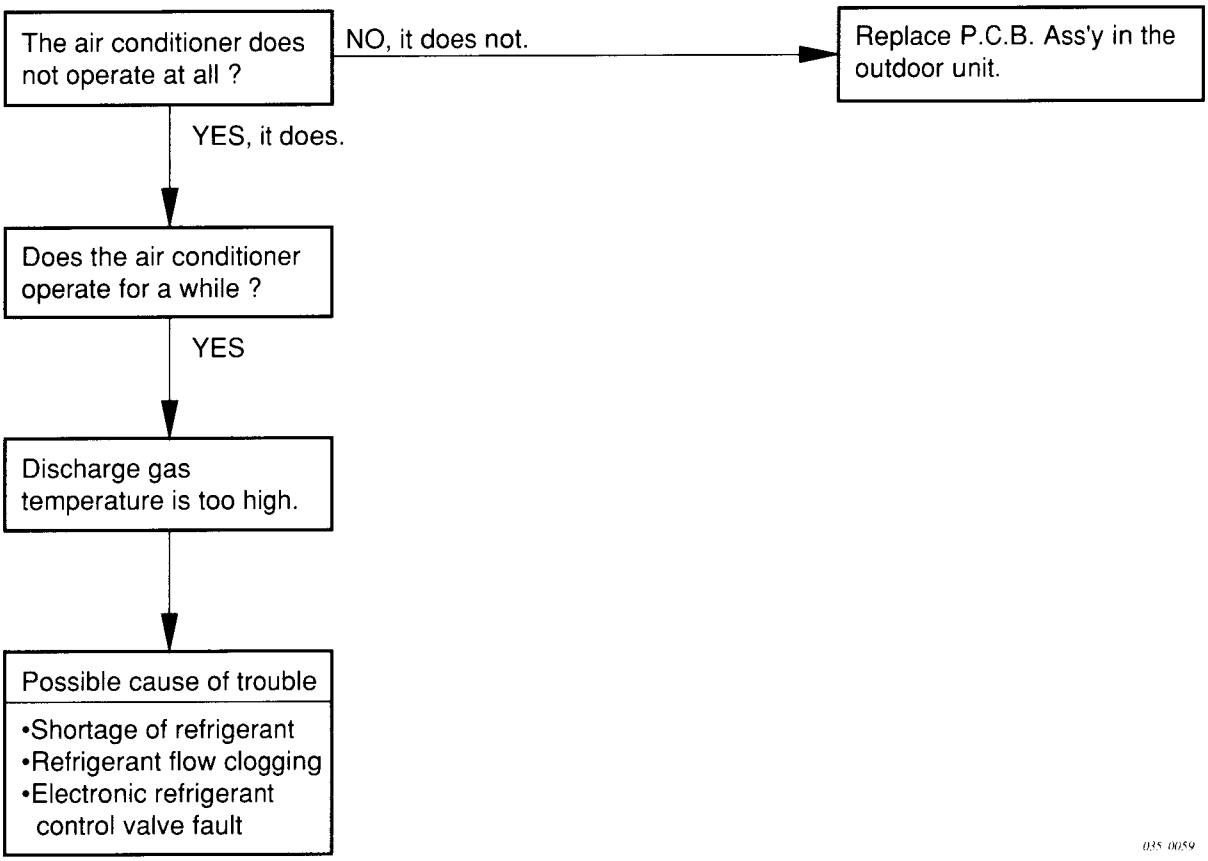
- Compressor motor thermal protector (49C).
- Outdoor fan motor thermal protector (49FO).



145_0070

⑧. CHECK and P3 are displayed on the remote control unit.

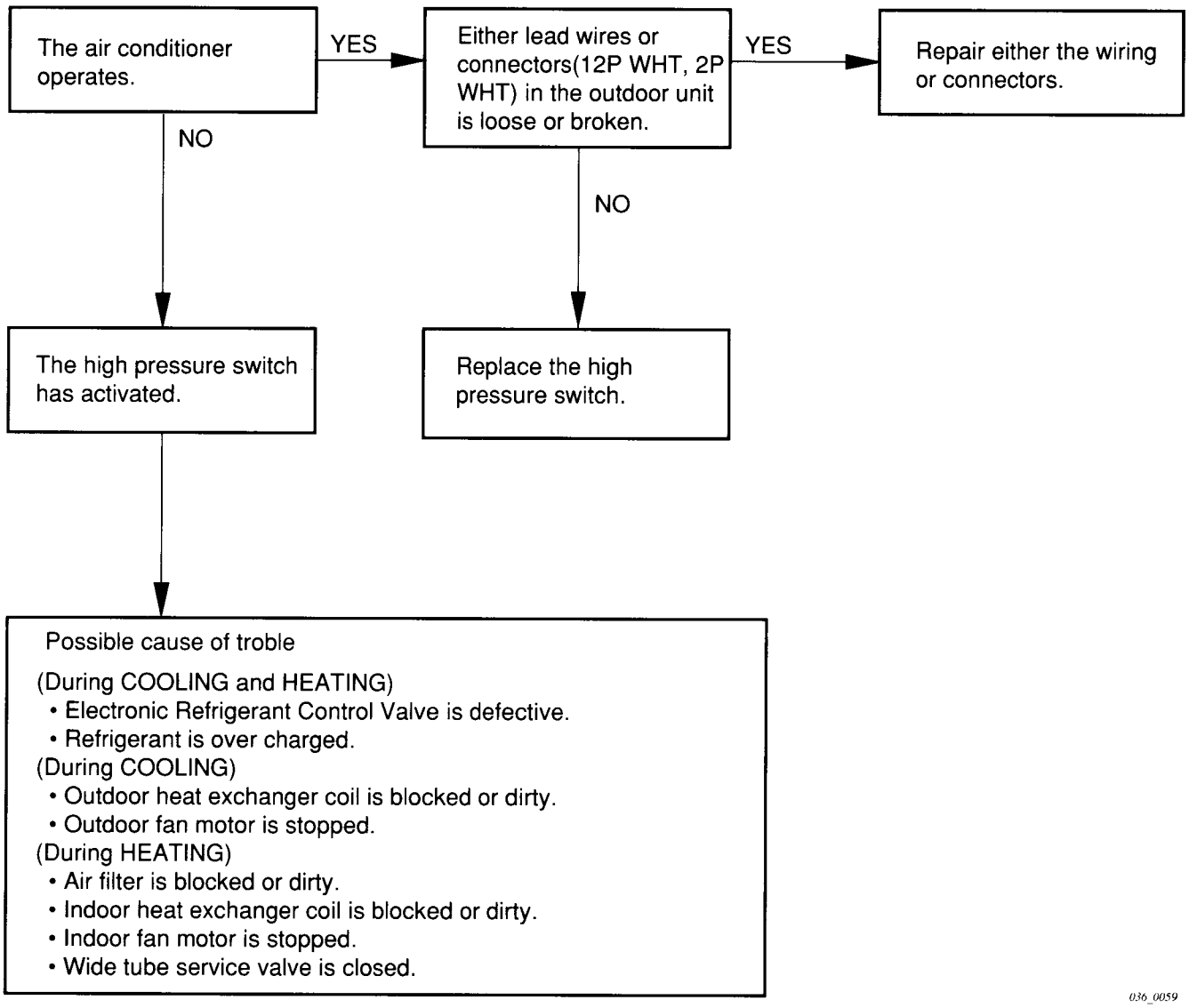
❑ The discharge gas temperature is too high. When the high pressure in the system rises the discharge temperature will increase also. Under normal conditions, when the discharge temperature (as measured by sensors **TH8** or **TH4**) rises above **110°C**, the air conditioner shuts down and **P3** appears on the display. Refer to "2 – 8 Discharge Temperature Control".



4

⑨. CHECK and P4 are displayed on the remote control unit.

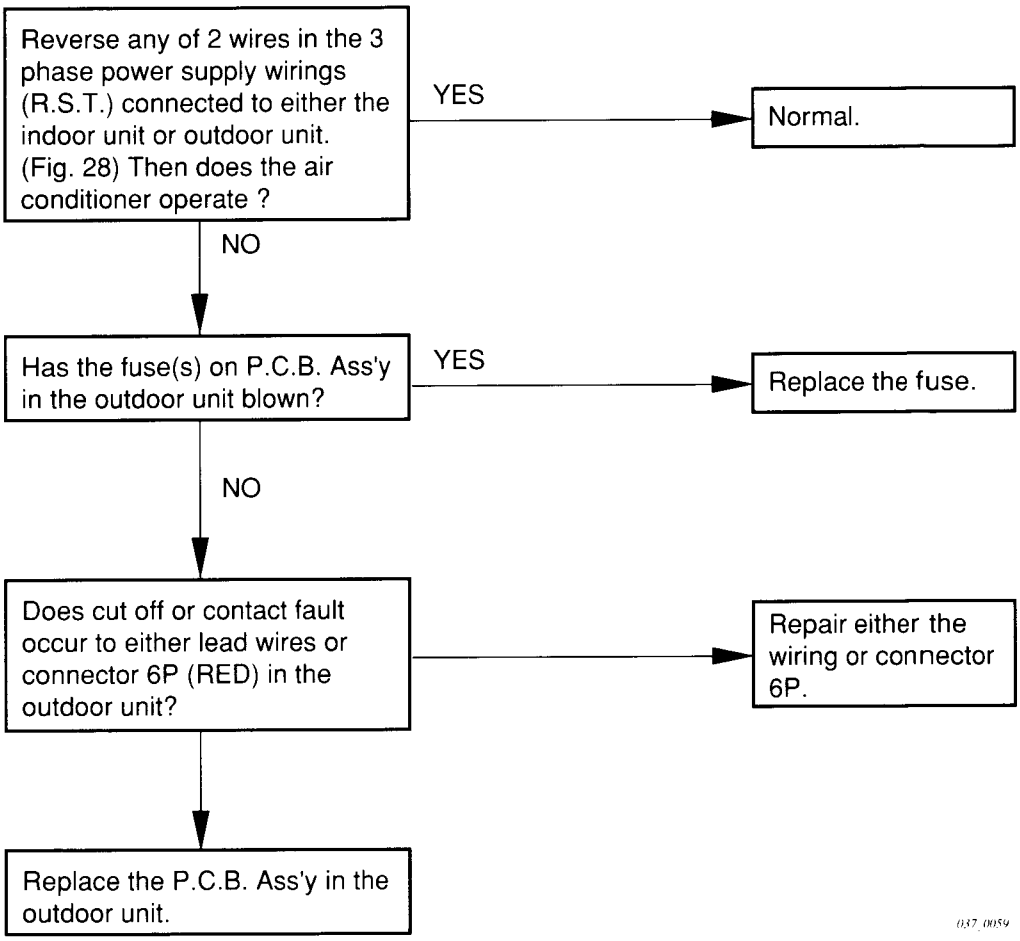
❑ High pressure switch 63PH has cut out.



036_0059

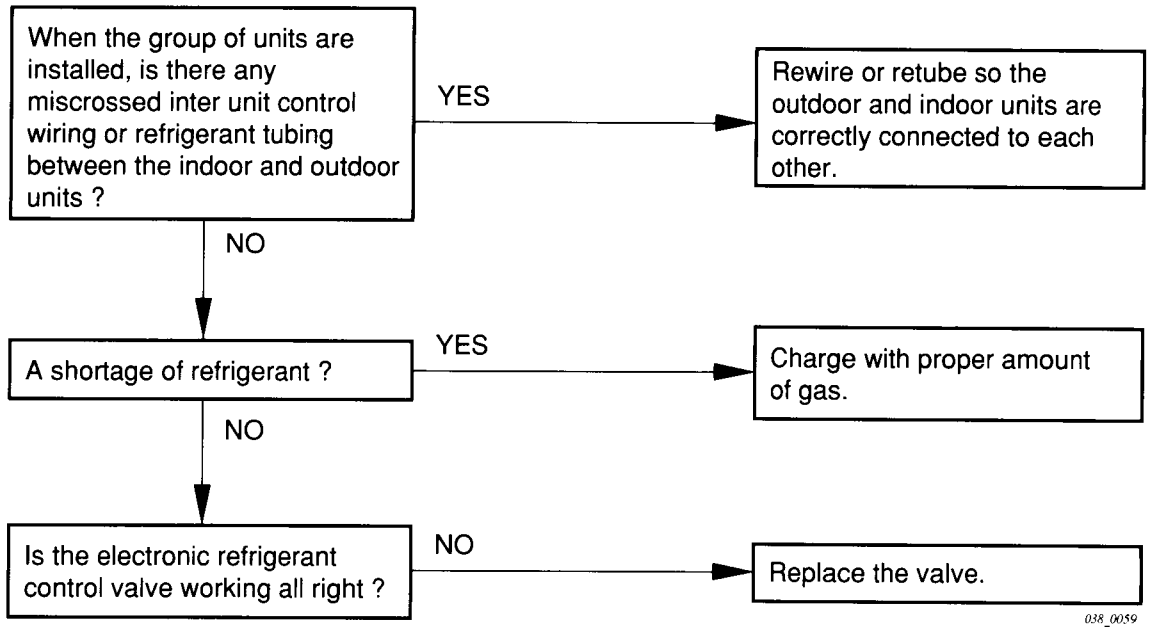
⑩. CHECK and P5 are displayed on the remote control unit.

❑ The control panel has detected negative phase (reversed phase) in the power supply.



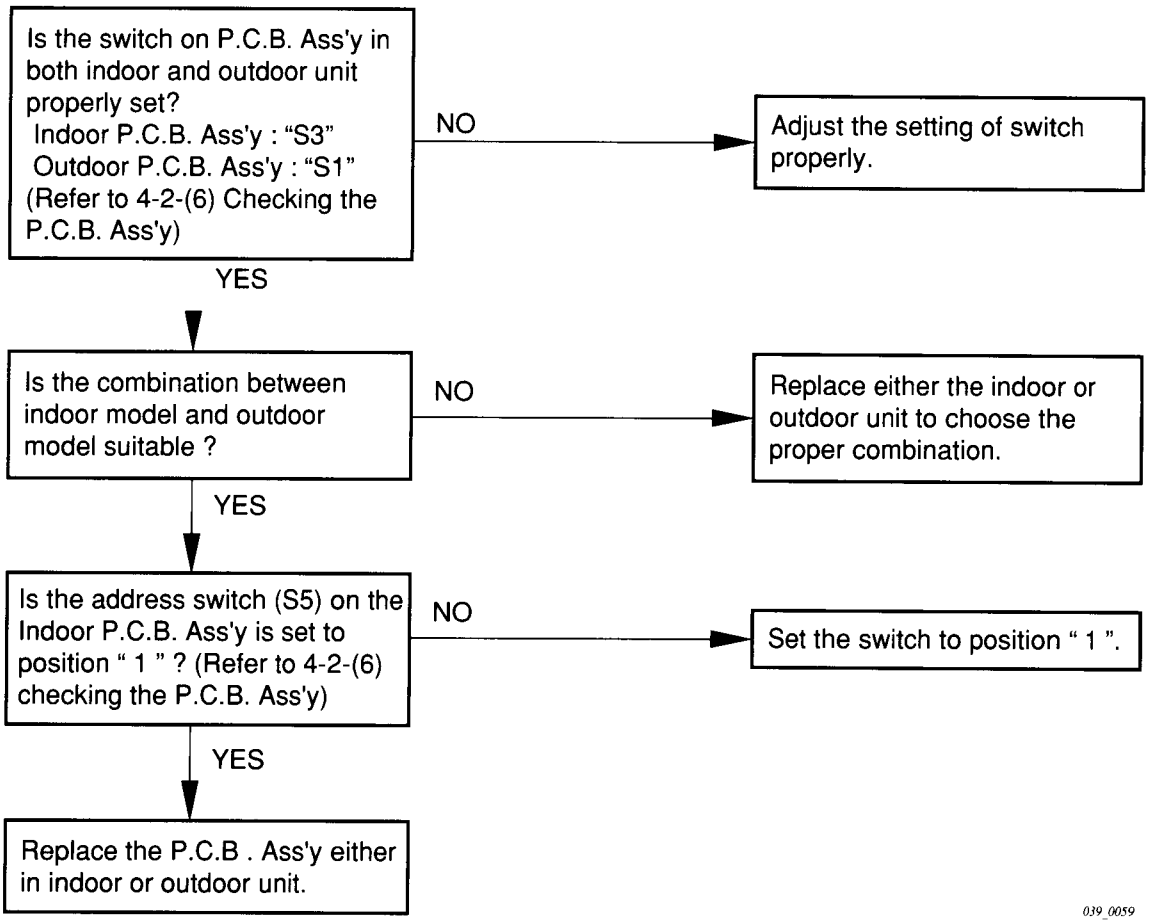
⑪. CHECK and H7 are displayed on the remote control unit.

❑ Crossed wires or refrigerant supply tubes between indoor and outdoor units.



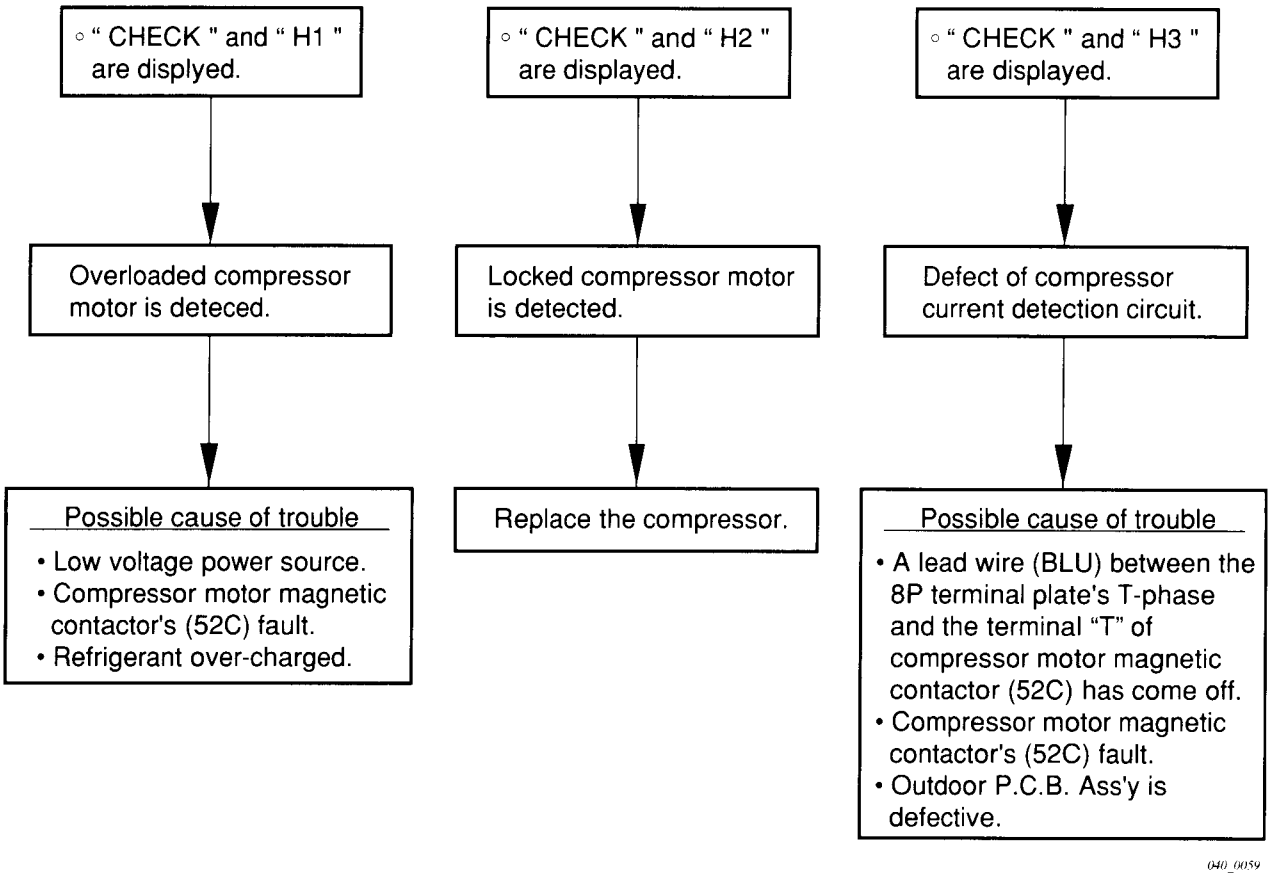
⑫. CHECK and P6 are displayed on the remote control unit.

❑ Incorrect capacity matching.



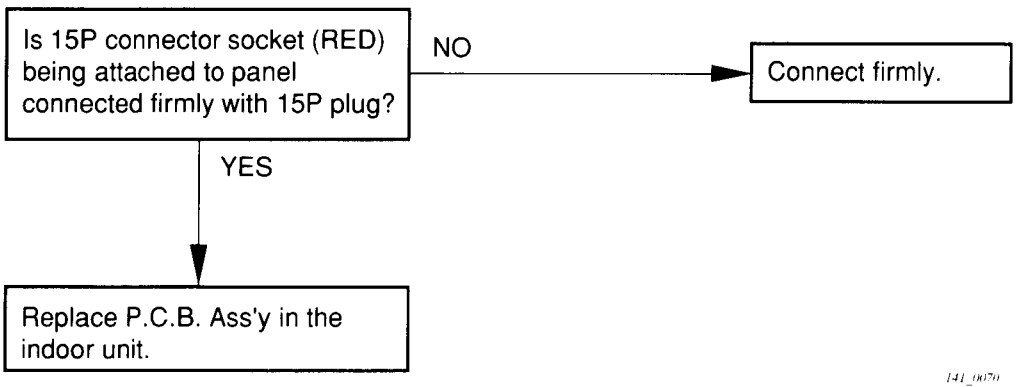
⑬. CHECK and either H1, H2 or H3 is displayed on the remote control unit.

❑ Protective device for the compressor has opened and shut off the current. Refer to "2 – 15 Compressor Current Detection Circuit".



040_0059

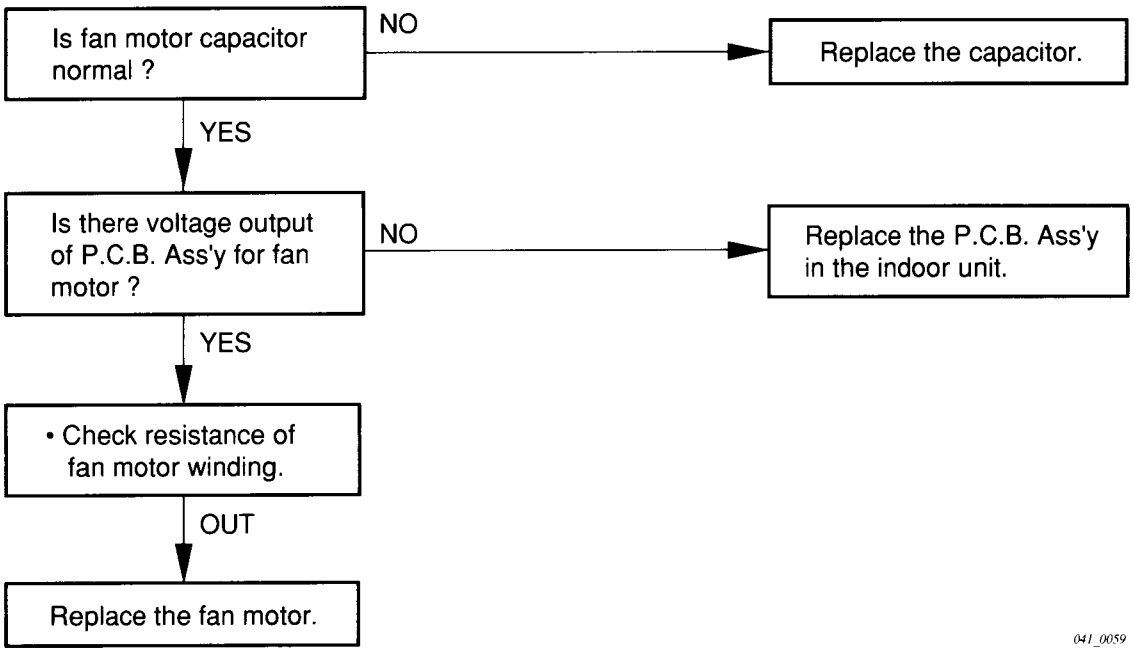
⑭. CHECK and P9 are displayed on the remote control unit.



141_0070

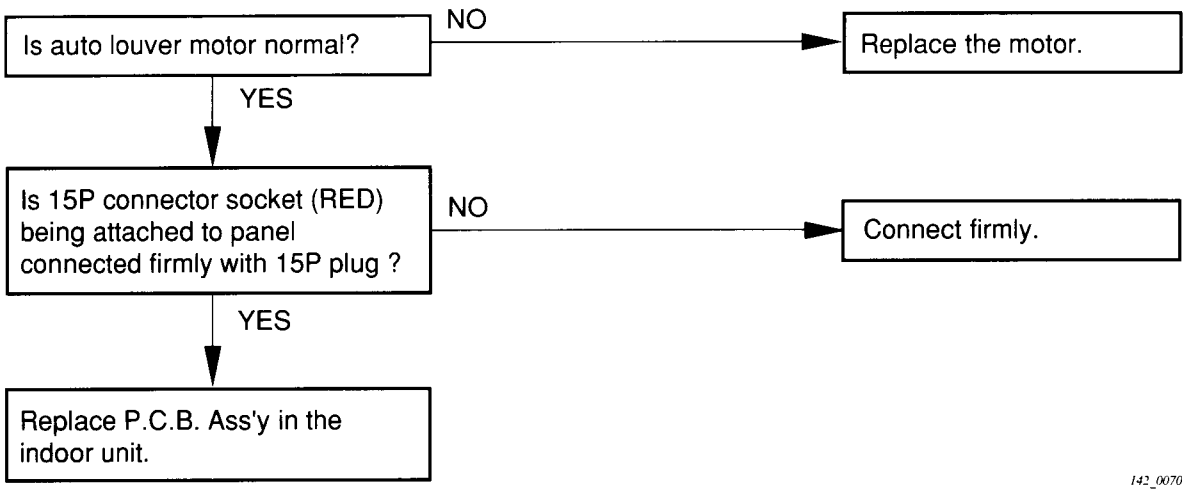
(6) Procedures for When a Specific Component Does Not Work at All

①. Indoor fan is not running at all.



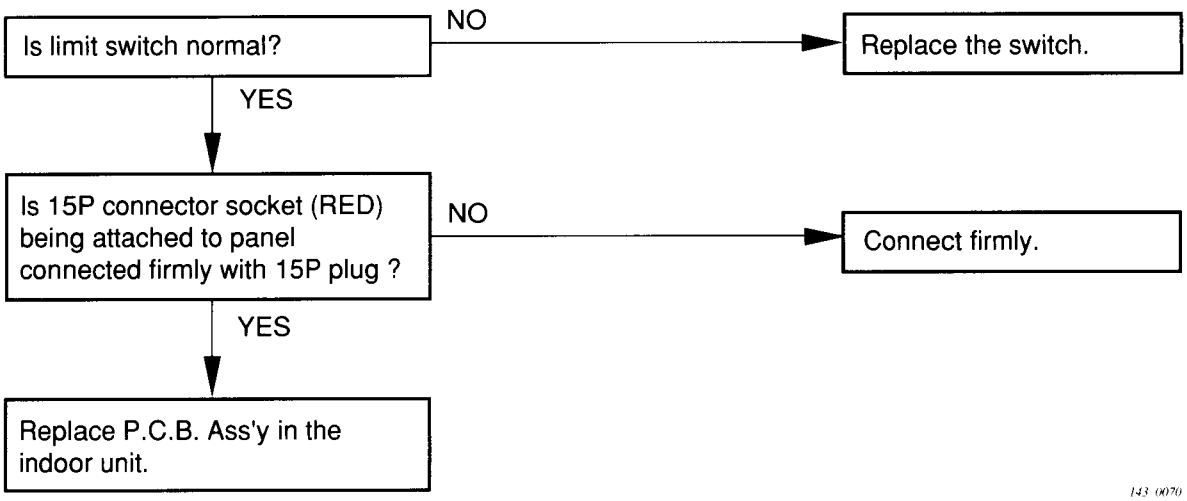
041_0059

②. Flaps in indoor unit's air outlet does not operate, even if you press SWEEP button.



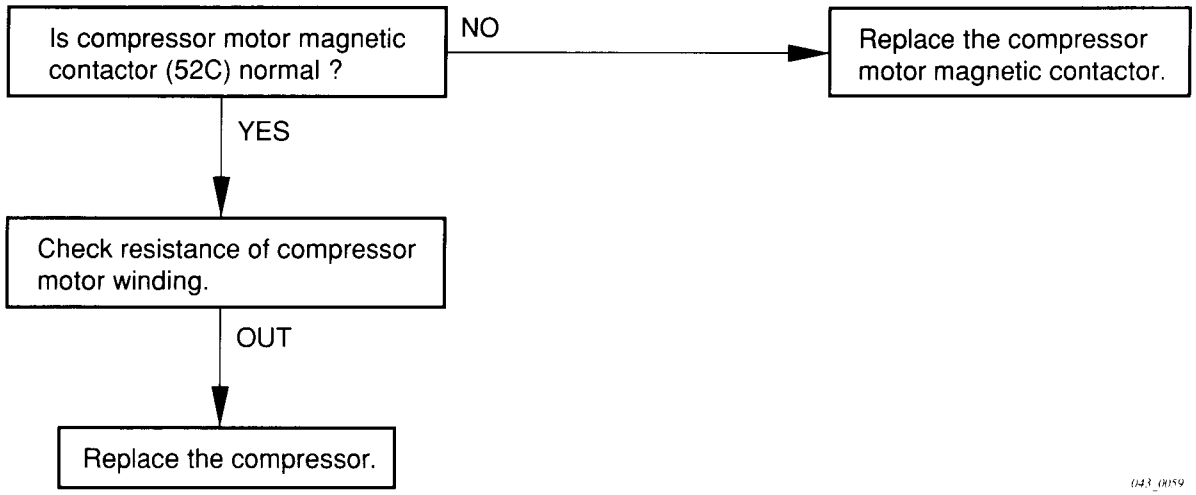
142_0070

③. Flap does not operate, if you press FAN AIM button. (When you press SWEEP button, flap operates.)

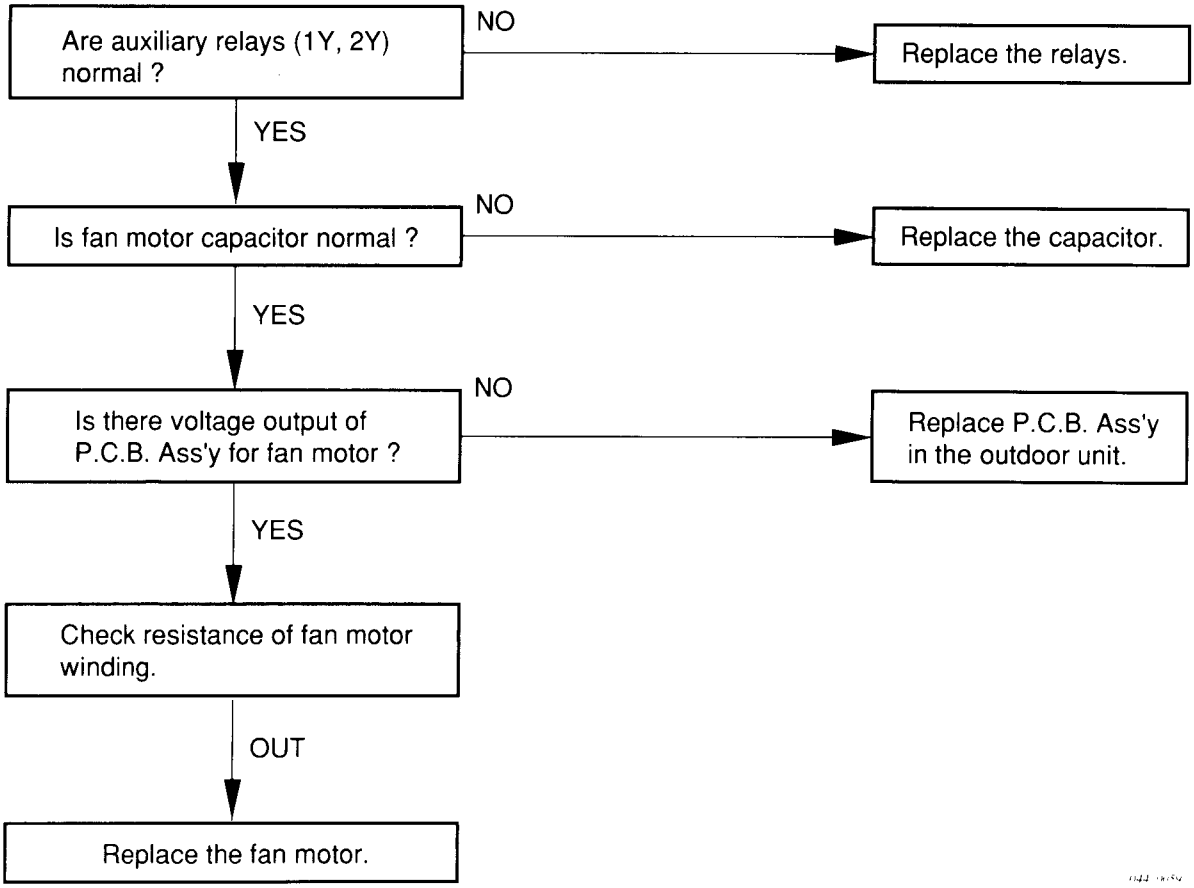


143_0070

④. Compressor motor is not running at all.



⑤. Outdoor fan is not running at all.



(7) Using the Remote Control Unit

From the remote control unit you can control both the operation and settings of the unit as well as perform several useful service checks. This section explains how to use the remote control unit to:

A. Set service check switches.
B. Use the test run procedure.
C. Check the sensor temperature readings.
D. Find out about past service problems.
E. Check the remote control unit itself for correct operation.

For operation and temperature setting instructions, see the Instruction Manual (included as section **5.** of this service manual).

(A). Service Check Switches

The service check switches are located on the back of the remote control unit's P.C.B. Ass'y.

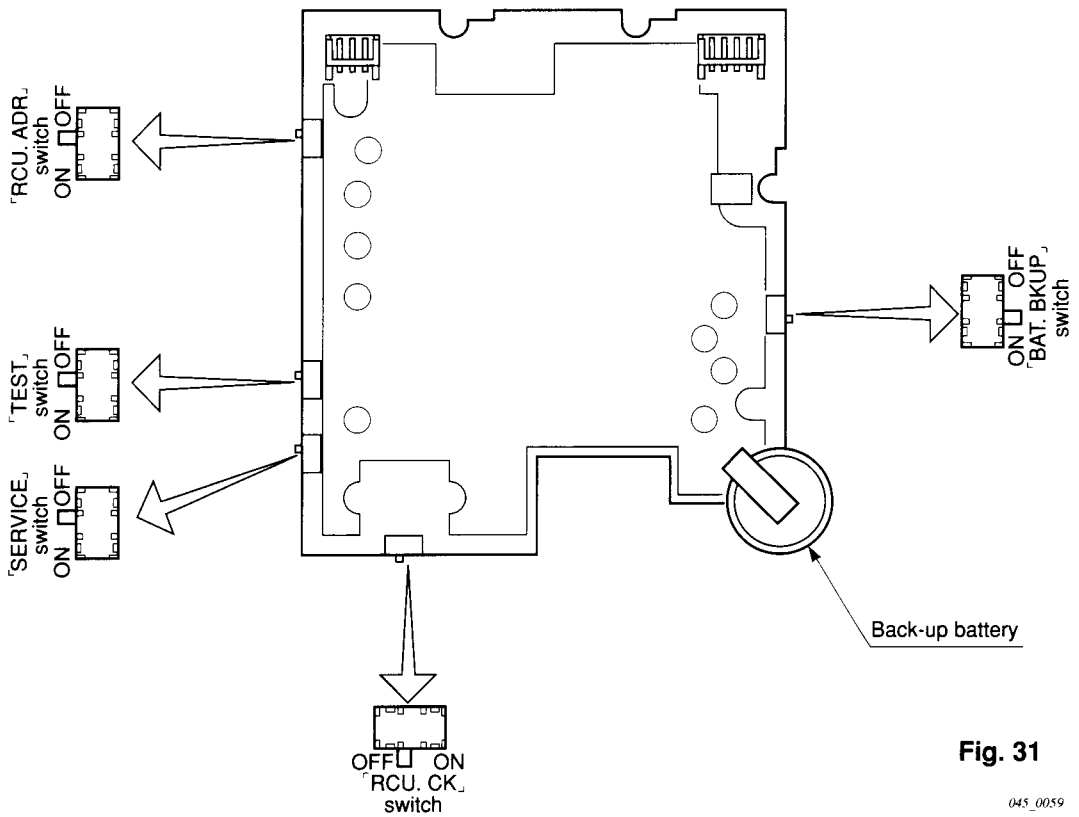


Fig. 31

The following are the correct switch settings for normal use of the unit. Only change the settings temporarily for making service checks. When you have changed the settings, **be sure to return them to the standard settings** shown here.

- ❑ **SERVICE** switch – Refer to section **4–1–(7)–(D) "Past service history display"**
- ❑ **RCU.CK** switch – Refer to section **4–1–(7)–(E) "Checking the remote control unit for correct operation"**
- ❑ **TEST** switch – Keep the switch **OFF** all the time
- ❑ **RCU.ADR** switch – Keep the switch **OFF** all the time
- ❑ **BAT.BKUP** switch – Keep the switch **ON** all the time

(B). Test Run Procedure

- ❑ The purpose of the test run function is to let you control the operation of the unit directly without the thermostat turning the unit on or off. As indicated in the following procedure, be sure to switch out of **TEST RUN** when you are finished, or the air conditioner can be damaged because it won't cycle on and off normally.
- ❑ To protect the air conditioner from overloading, the outdoor unit will not start running for **3** minutes after power is applied or the unit is turned **OFF**.

ⓐ. Press the TEST RUN button at the bottom right on the remote control unit.

ⓑ. Press the ON/OFF operation button to start the test run.

ⓒ. Press the MODE button to select either COOL or HEAT mode.

ⓓ. When the test run has started, "TEST RUN" shows on the remote control unit's display.

ⓔ. During the test run, the air conditioner runs continuously and the thermostat does not control the system.

ⓕ. After the test run, be sure to press the TEST RUN button once again to cancel this mode and be sure "TEST RUN" is not shown on the display.

Remote Control Unit

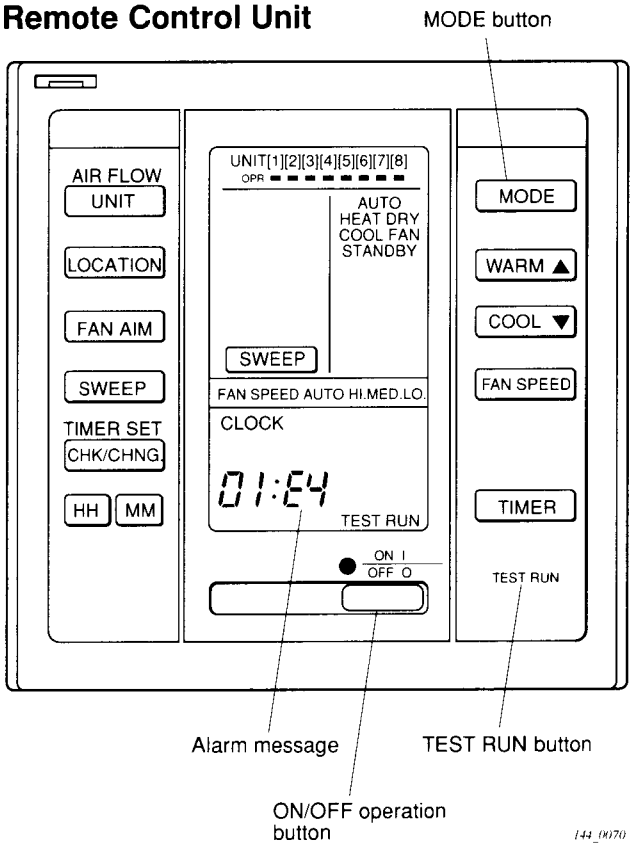


Fig. 32

CAUTION

The TEST RUN button is used **only for servicing** the air conditioner. **Do not** press this button for normal operation, or the system may be damaged.

(C). Sensor temperature display

The air conditioner has temperature sensors placed in areas where temperature levels control the heating or cooling process.

- ❑ Each sensor has an address which is made up of the unit address, the multi address, and the **sensor number**. The unit address and multi address are used only when several units are hooked up to one remote control unit. If there is only **one unit**, made up of **one** indoor and **one** outdoor component, then only the sensor number must be put in, as shown in the procedure below.

Follow this procedure to display the temperature of each sensor:

ⓐ. On the remote control unit, press both **HH** and **MM** buttons at the same time for 3 seconds.

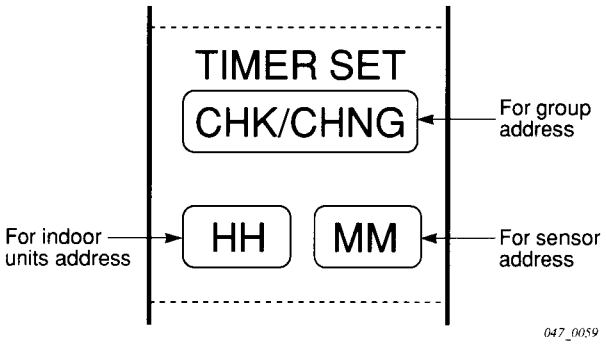


Fig. 33

ⓑ. Once in this mode, the display will show the address and temperature of the sensors instead of its usual information.

NOTE

Do not press **CHK/CHNG** or **HH** buttons during checking.

- ❑ For this model the unit address and multi address are fixed at **01**.
- ❑ Each time you press the **MM** button you select a different sensor, and the display shows the sensor number and temperature as shown below.

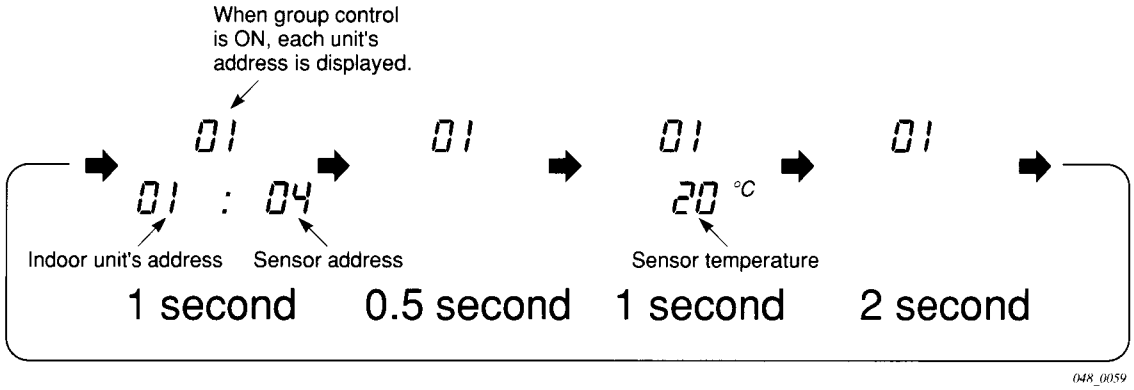


Fig. 34

NOTE

After sensor address displayed for 1 second, wait for 0.5 second to display the sensor temperature reading.

ⓒ. Each time you press the **MM** button the display changes from one sensor to the next in numerical order from **01** to **16**, and then back to **01** again.

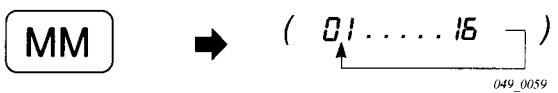


Fig. 35

Refer to the table below for the relationship between the sensor number and the location of the sensor.

	Sensor Address	Location of Sensor (Thermistor)
Indoor Unit	01	TH1 Room Temp.
	02	TH2 Indoor coil Temp. E1 (ent.)
	03	TH3 Indoor coil Temp. E2 (mid.)
	04	—
Outdoor Unit	05	TH8 Discharge gas Temp. (Cooling)
	06	TH5 Outdoor air Temp.
	07	TH6 Outdoor coil Temp. C1
	08	TH7 Outdoor coil Temp. C2
	09	TH4 Discharge gas Temp. (Heating)
	10	—
	11	—
	12	—
	13	—
	14	—
	15	—
	16	—

NOTE
In case there are no sensor equipped with the unit, - - - - °C is shown on the display.

ⓓ. Resetting the remote control unit display back to normal.

- ❑ To reset the display when you are finished, press both HH and MM buttons at the same time for 3 seconds, then the remote control unit will return to clock display mode and show the present time.

4

(D). Past service history display

The remote control unit can store the **4 most recent alarm codes**, so you can see what kind of problems the unit has had, if any. Knowing what has already happened and been fixed helps you know what to check at present.

- ❑ This function is usable even if the unit is not working.
- ❑ To display the past error codes, follow the procedure below.

Procedure:

ⓐ. Turn **ON** the **SERVICE** switch on the **back** of the P.C.B. Ass'y in the remote control unit. See Section **4–1–(7)–(A)** in this chapter for exact location.

ⓑ. When the switch is turned **ON** a change from the normal display to service check display takes place, as shown in the table below:

NORMAL DISPLAY	Display Change (➡)	SERVICE CHECK DISPLAY
Set temp. XX°C	➡	Group address (Unit Number)
Hours	➡	Indoor unit's address
Minutes	➡	Alarm Message

The panel now shows this display, and cycles automatically as shown below.

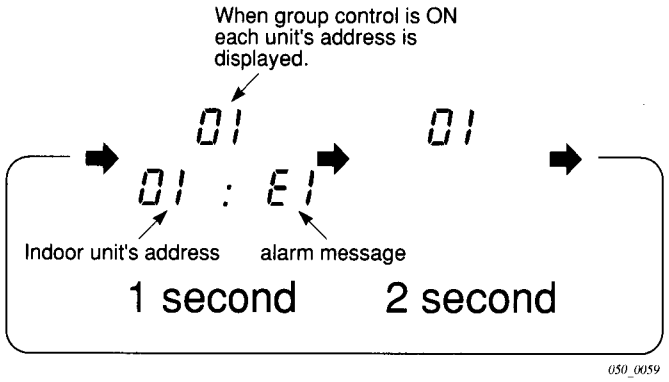


Fig. 36

ⓒ. A maximum of **4** alarm messages can be accessed by pressing either **HH** or **MM** as follows:

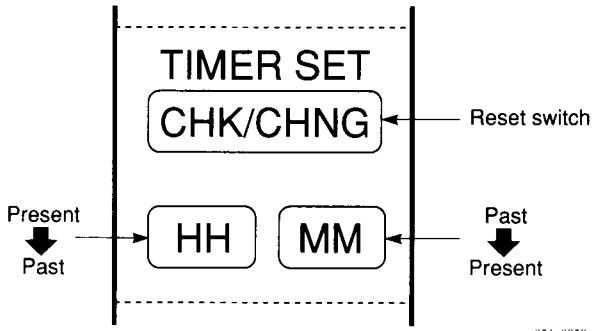


Fig. 37

NOTE Pressing this Reset switch will clear all the service history.

HH . . . . accessed in order of "Present ➡ Past".
MM . . . . accessed in order of "Past ➡ Present".

For example, if the last four alarm messages were, in order of occurance from oldest to most recent, **P1**, **P9**, **P4**, and most recently **E1**, then the display would look as shown below as you pressed **HH** four times. The 5th time you pressed **HH** you would start the display cycle over, and the first message would be shown again.

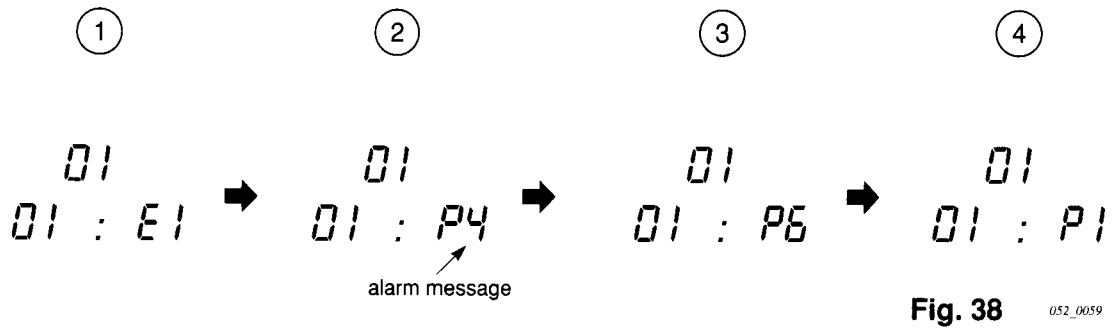


Fig. 38 052_0059

If there are no alarm messages, the display shows:

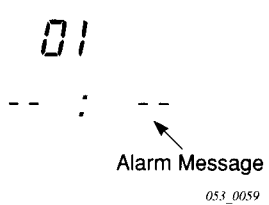


Fig. 39

IMPORTANT

Never press CHK/CHNG button unless you want to erase the accessed data in memory. Follow the procedure below only when erasing is necessary.

- ❑ To erase accessed data, press the **CHK/CHNG** button.
- ❑ When erasing is finished, – – : – – shows on the remote control unit's display.

CAUTION

After checking the **alarm messages** be sure to set the **SERVICE** switch back to its **original position.**

(E). Checking the control panel for correct operation

The remote control unit has a **self-diagnostic** function to check if it works properly. Use this procedure to find out if the remote control unit itself in defective:

ⓐ. Turn **ON** the **RCU.CK** switch on the back of the **P.C.B.** Ass'y in the remote control unit. See section **4–1–(7)–(A)** for exact location.

ⓑ. The appearance of the display will tell you whether or not the remote control unit is working correctly or not.

- ❑ **Normal condition** – All displays appear for 10 seconds, then disappear.
- ❑ **Abnormal condition** – All displays flash ON and OFF for 10 seconds, then disappear.

CAUTION

After checking the panel, be sure to set the RCU.CK switch to this original OFF position.

4

4-2 Checking the Electrical Components

(1) Measurement of Insulation Resistance

- The insulation is in good condition if the resistance exceeds 1 MΩ.

① Power Supply Wires

Clamp the earthed wire of the Power Supply wires with a lead clip of the insulation resistance tester and measure the resistance by placing a probe on either of the power wires. (**Fig. 40**)

Then measure the resistance between the earthed wire and the other power wires. (**Fig. 40**)

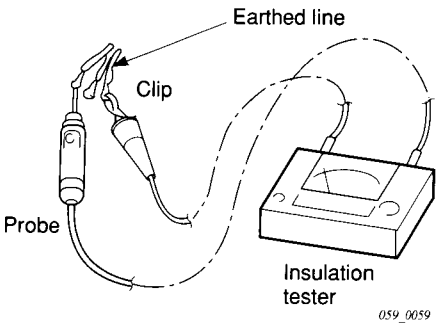


Fig. 40

② Indoor Unit

Clamp an aluminum plate fin or copper tube with the lead clip of the insulation resistance tester and measure the resistance by placing a probe on ①, and then ②, and then ③ on the 6P terminal plate (**Fig. 41**)

See **Fig. 29**.

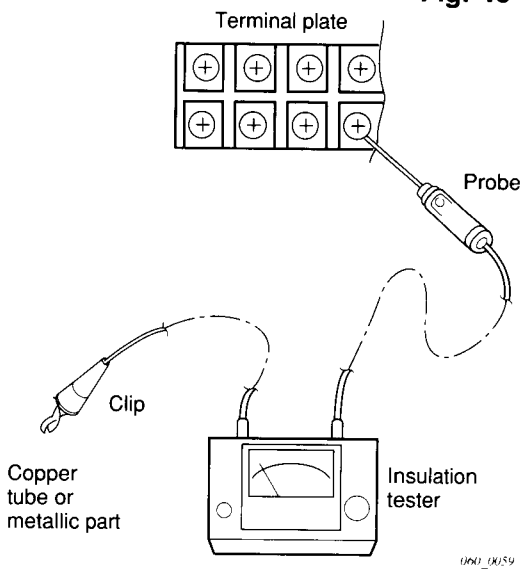


Fig. 41

③ Outdoor Unit

Measure the resistance on ⑤ and then ⑥, and then ⑦ on the 8P terminal plate in the same manner as explained above (2). (**Fig. 41**)

See **Fig. 29**.

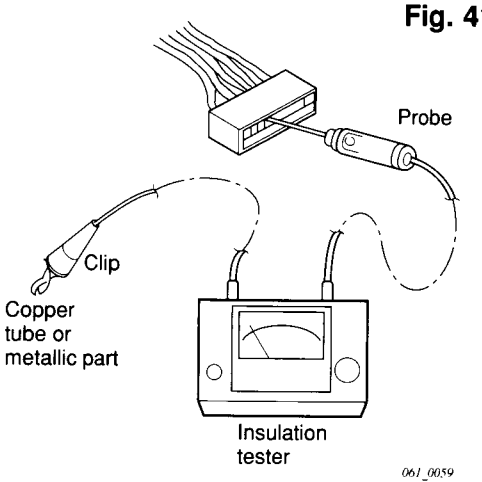


Fig. 42

④ Measurement of Insulation Resistance for Electrical parts

- Disconnect the connector of the desired electric part from terminal plate, P.C.B. A'ssy, etc. (**Fig. 42**)
- Similary, disconnect the lead wires from compressor, capacitor, etc. (**Fig. 43**)
- Measure the resistance in the same manner as illustrated on the right.

  Refer to Electrical Wiring Diagram.

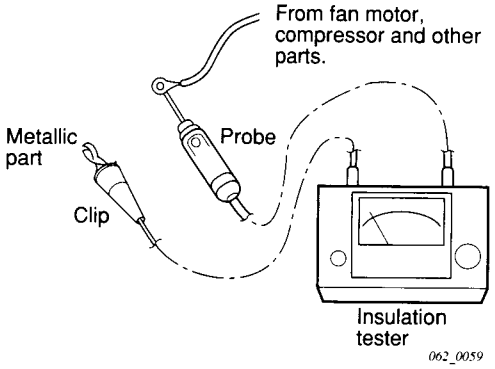


Fig. 43

NOTE
If the probe does not enter the hole because the hole is too narrow, use a probe with a thinner pin.

(2) Checking of Protective Devices

- Disengage the connector, which consists of P (plug) and S (socket) when you want to check the protective device.
- Then check continuity among plug's (and/or socket's) terminal as in **Fig. 44**.
- Normality of the protective device can be judged by the following table.
  The Protective Device is proved normal if there is a continuity between terminals.

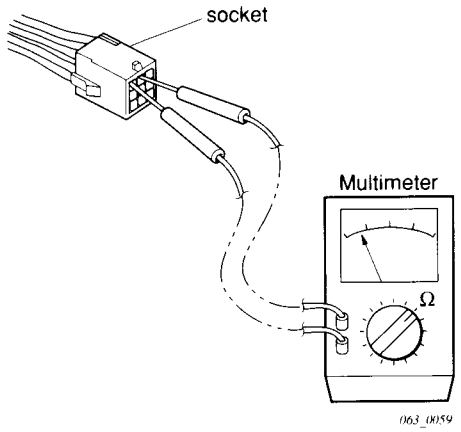


Fig. 44

① Indoor fan motor thermal protector (49FI) . . . . . Indoor unit

- Disconnect 8P connector (WHT) which leads to the indoor fan motor (FMI).
- Check the socket's terminals between No. 3 (GRY lead wire) and No. 4 (GRY lead wire).

② Compressor motor thermal protector (49C) . . . . . Outdoor unit

- Disconnect both 8P connector (WHT) and 12P connector (WHT) in the outdoor unit.
- Check terminal between 8P plug's No. 3 (GRY lead wire) and 12P socket's No. 10 (GRY lead wire).

③ Outdoor fan motor thermal protector (49FO) . . . . . Outdoor unit

- Disconnect both 8P connector (WHT) which leads to the outdoor fan motor (FMO).
- Check socket's terminal between No. 3 (GRY lead wire) and No.4 (GRY lead wire).

④ High pressure switch (63PH) . . . . . Outdoor unit

- Disconnect 2P connector (WHT) which leads to the high pressure switch (63PH).
- Check the socket's terminal between No. 1 (BLK lead wire) and No. 2 (BLK lead wire).

(3) Checking of Electrical Parts

① **Power transformer (TR1) ..... Indoor unit** *Measure the coil resistance.

- Primary ; Measure the resistance between No.1 and No.2 (WHT lead wires) terminals of 2P (WHT) socket jointed to power transformer.
- Secondary 10.8V ; Measure the resistance between No.1 and No.2 (YEL lead wires).

  13.5V ; Measure the resistance between No.3 and No.4 (BRN lead wires).

  11.2V ; Measure the resistance between No.5 and No.6 (RED lead wires).

Refer to "1–3–(A) Other component specifications".

② **Power transformer (TR2) ..... Outdoor unit** *Measure the coil resistance.

- Primary ; Measure the resistance between No.1 and No.2 (WHT lead wires) terminals of 2P(WHT) socket jointed to power transformer.
- Secondary 10V-A ; Measure the resistance between No.1 and No.2 (BRN lead wires).

  10V-B ; Measure the resistance between No.3 and No.4 (RED lead wires).

Refer to "1–3–(B) Other component specifications".

③ **Indoor fan motor (FMI) ..... Indoor unit** *Measure the coil resistance.

- Measure the resistance between each terminal of 9P (WHT) socket jointed to the indoor fan motor.

Refer to "1–2–A Major component specifications".

④ **Outdoor fan motor (FMO) ..... Outdoor unit** *Measure the coil resistance.

- Measure the resistance in the same manner as explained above (3).

Refer to "1–2–B Major component specifications".

⑤ **Fan motor capacitor ..... Both in indoor and outdoor unit**

- Remove the lead wires from the capacitor terminals, and then place a probe on the capacitor terminals as shown in **Fig. 45**. Observe the deflection of the pointer, setting the resistance measuring range of the multimeter to the maximum value.
- The capacitor is "good" if the pointer bounces to a great extent and then gradually returns to its original position.

NOTE

The range of deflection and the deflection time differ according to the capacity of the capacitor.

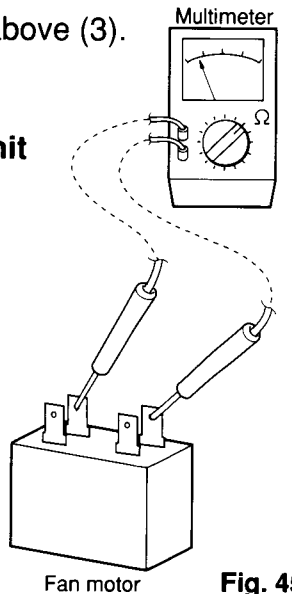


Fig. 45

064_0059

⑥ **Solenoid coil of the electronic refrigerant** *Measure the coil resistance.

control valve (ERCV) ..... Indoor unit

- Measure the resistance between No. 5 (GRY lead wire) and other terminals (another color of lead wires) of 5P (WHT) plug jointed to the solenoid coil.

  Refer to "1-2-(A) Major component specifications".

⑦ **Compressor motor (CM) ..... Outdoor unit** *Measure the coil resistance.

- Measure the resistance between "U" (RED lead wire) and "V" (WHT lead wire) terminals, "U" and "W" (BLU lead wire) terminals and "V" and "W" terminals on the compressor motor magnetic contactor.

  Refer to "1-2-(B) Major component specifications".

⑧ **Compressor motor magnetic contactor (52C) ..... Outdoor unit**

- Measure the resistance between A (ORG lead wire) and B (GRY lead wire) terminals on the compressor motor magnetic contactor.

  Refer to "1-3-(B) Other component specifications".

- Check the continuity between contactors.

MODEL	FMCA–1S			
Push button on the magnetic contactor	Pair of terminals			
	R – U	S – V	T – W	31 – 32
no press	——	——	——	YES
press	YES	YES	YES	——

⑨ **Auxiliary relay (1Y, 2Y) ..... Outdoor unit** *Measure the coil resistance.

- Measure the resistance between No. 1 (BRN lead wire) and No. 2 (ORG lead wire) terminals and No. 3 (RED lead wire) and No. 4 (BLU lead wire) terminals of 6P (WHT) socket connected to auxiliary relays.

  Refer "1-3-(B) Other component specifications".

⑩ **Solenoid coil of 4-way valve (20S) ... Outdoor unit**

*Measure the coil resistance.

- Measure the resistance between No.1 (BLK lead wire) and No.2 (BLK lead wire) terminals of 2P (YEL) socket jointed to the solenoid coil.

  Refer "1-3-(B) Other component specifications".

⑪ Fuse on indoor and outdoor P.C.B. Ass'y .... Both in indoor and outdoor unit

*Check the continuity.

- Remove the P.C.B. Ass'y from the electrical component box. Then pull out the fuse from the P.C.B. Ass'y. (**Fig. 46**)

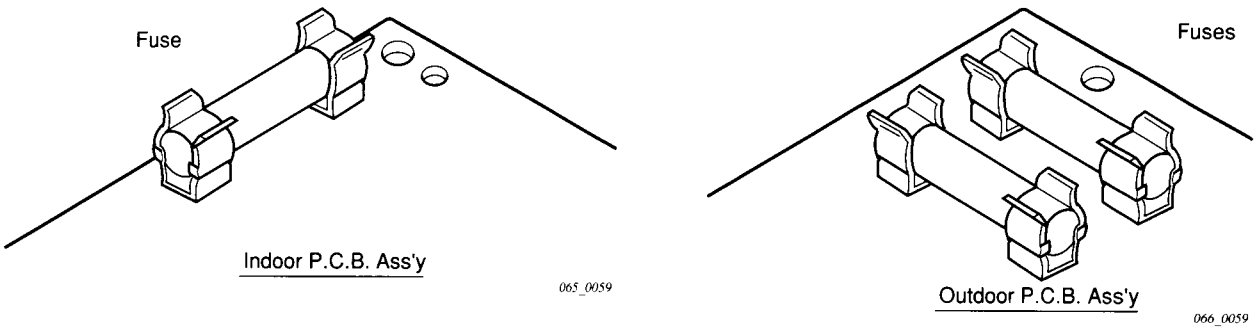


Fig. 46

- Then check for continuity of the fuse by using the multimeter. (**Fig.47**)

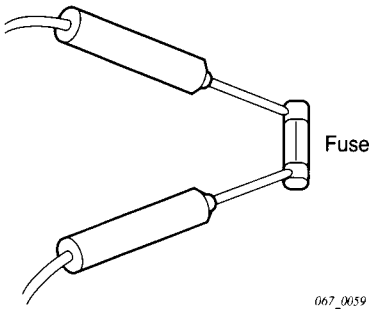


Fig. 47

(4) Arrangement of Electrical Parts and Thermistor Location

① Indoor unit : SPW-T252GH5

- Electrical parts

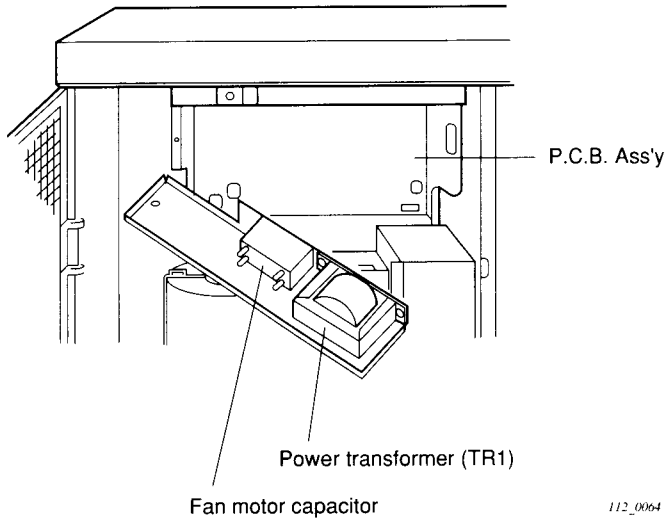


Fig. 48

- Thermistor location

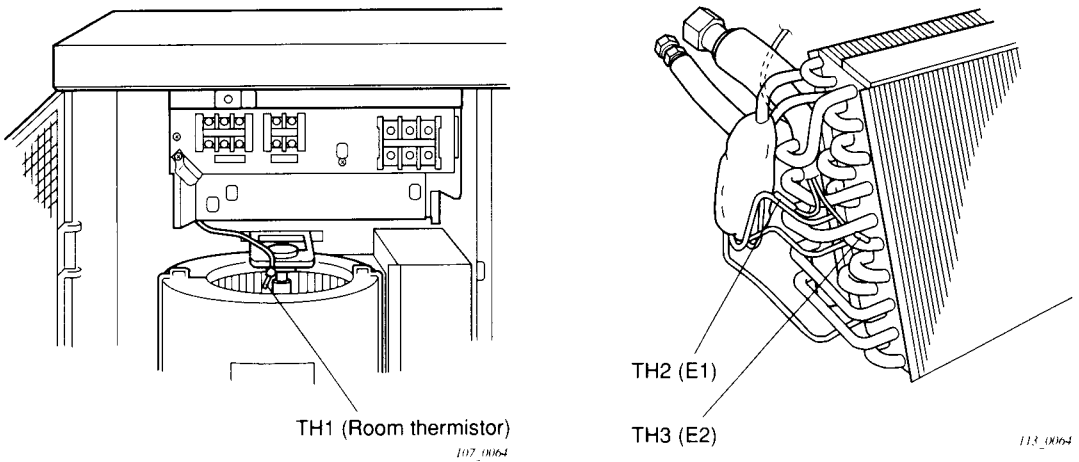


Fig. 49

	TH2(E1)	TH3(E2)
Cool	Entrance	Middle
Heat	Exit	Middle

② Outdoor unit : SPW-C252GH8

- Electrical parts

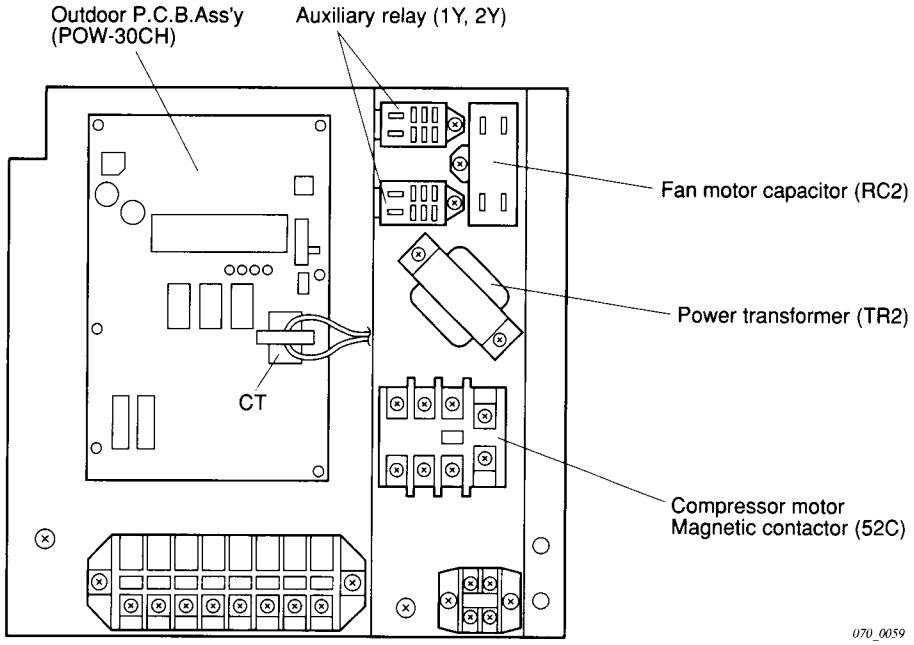
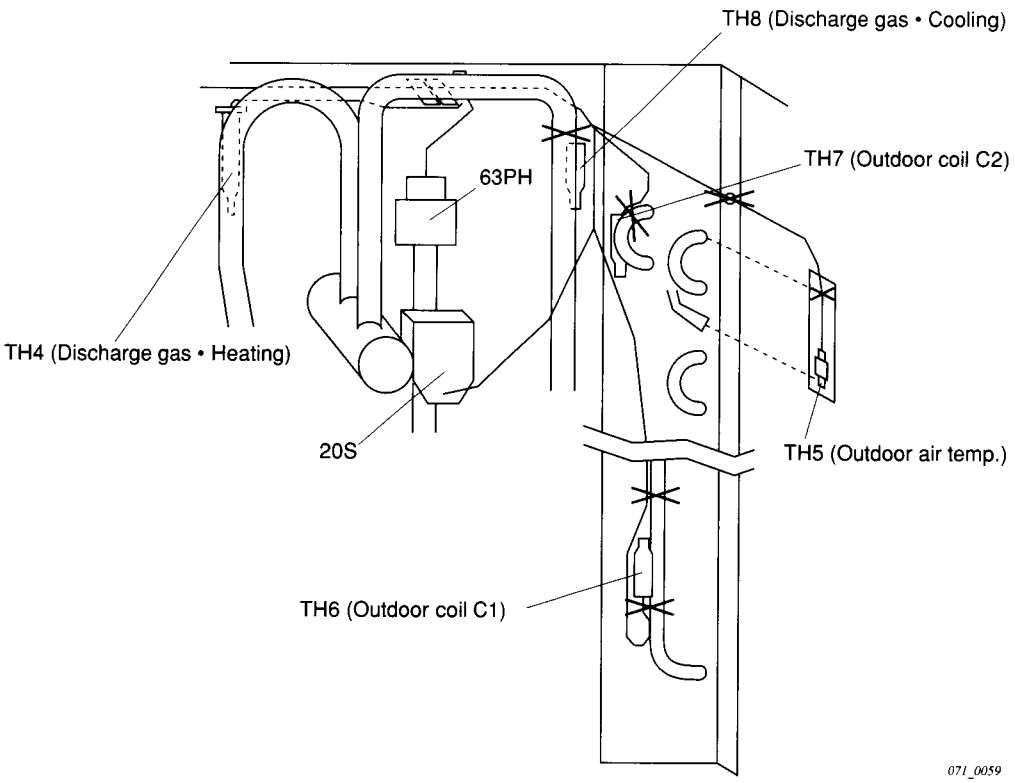


Fig. 50

- Thermistor location



63PH : High pressure switch
20S : Solenoid coil of 4-way valve

Fig. 51

(5) Thermistor Characteristic Curve

① Room temp. sensor : TH1 (SDT-500B)

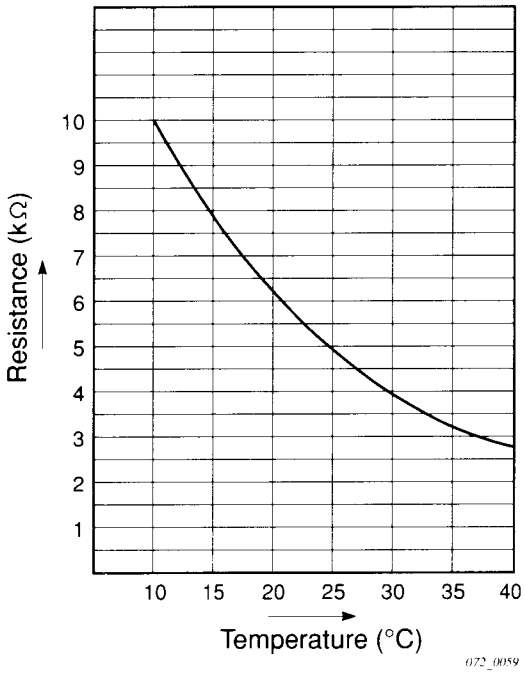


Fig. 52

② Indoor heat exch. coil sensor : TH2(E1), TH3(E2)
Outdoor air temp. sensor : TH5
Outdoor heat exch. coil sensor : TH6(C1), TH7(C2) (PCB-41E)

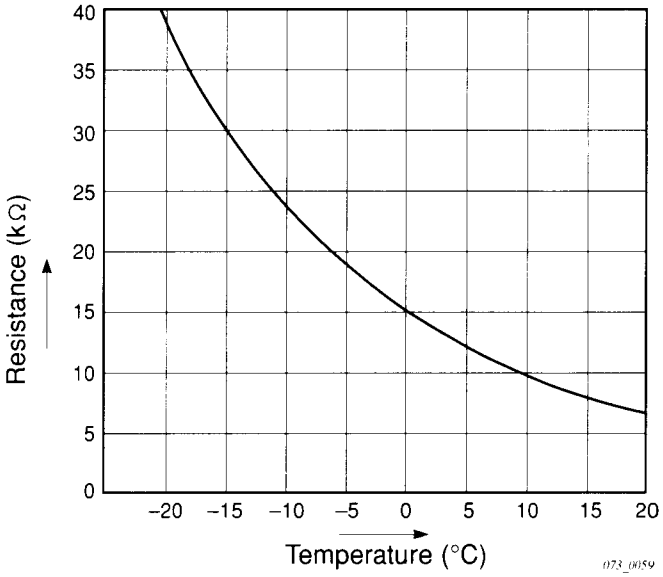


Fig. 53

③ Compressor discharge gas temp sensor : TH8 (Cooling)
Compressor discahrge gas temp sensor : TH4 (Heating)
(PTC-51H)

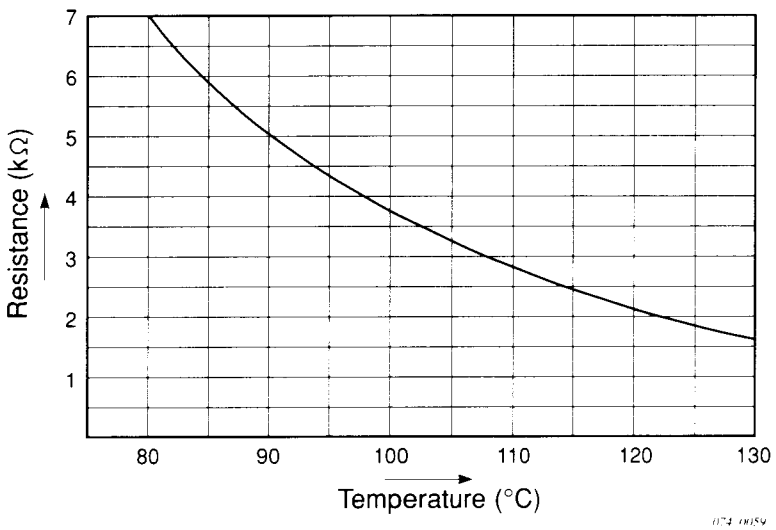


Fig. 54

(6) Checking the P.C.B. Ass'y

Make sure that the setting of switches (S) on P. C. B. Ass'y is positioned (ON and OFF) as follows.

Indoor P.C.B. Ass'y

- S1 (SLV) .... Set to "NORMAL".
- S2 (BLK) .... Set to "OFF" 1 through 4.
- S3 (GRN) ... Set to as the table below.

Table

Model No.	1	2	3	4
SPW-T252GH5	ON	OFF	ON	OFF

- S4 (BLK) .... Set to as the table below.

Model No.	1	2	3
SPW-T252GH5	OFF	OFF	ON

- S5 (BLK) .... Set to "1".
- S6 (WHT) ... Set to "1".

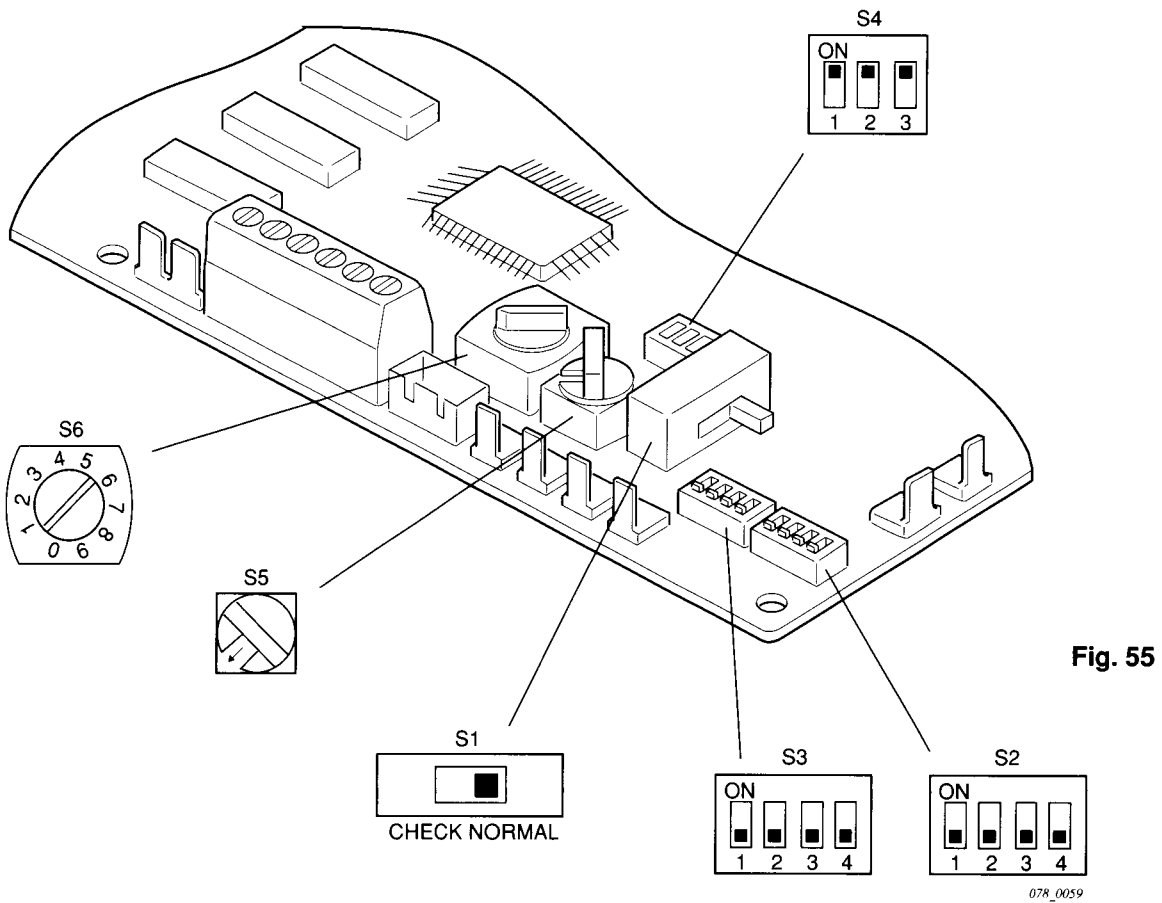


Fig. 55

Indoor P.C.B. Ass'y (POW-X252GH)

Outdoor P.C.B. Ass'y

- S1 (GRN) .... Set to as the table below.

Model No.	1	2	3	4
SPW-C252GH8	ON	OFF	ON	OFF

- S2 (SLV) .... Set to "NORMAL".
- S3 (BLK) .... Set as the table below.

Model No.	1	2
SPW-C252GH8	ON	OFF

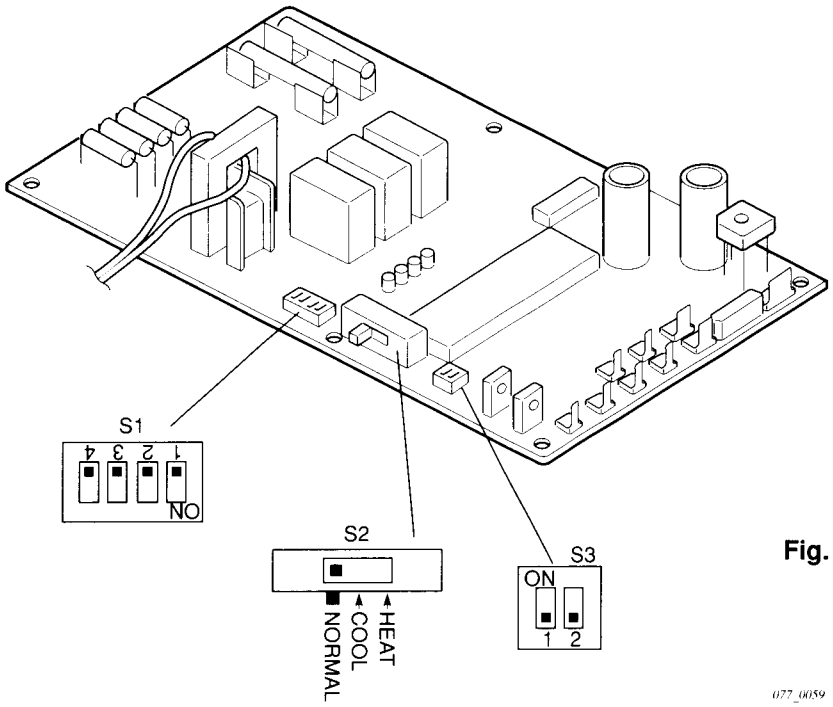


Fig. 56

Outdoor P.C.B. Ass'y (POW-30CH)

4

5. INSTRUCTION MANUAL

Contents

Product Information

If you have problems or questions concerning your Air Conditioner, you will need the following information. Model and serial numbers are on the name plate.

Model No. _____ Serial No. _____

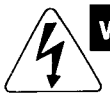
Date of purchase _____

Dealer's address _____

Phone number _____

Alert Symbols

The following symbols used in this manual alert you to potentially dangerous conditions to users, service personnel or the appliance:



WARNING **This symbol refers to a hazardous or unsafe practice which can result in severe personal injury or death.**

CAUTION **This symbol refers to a hazardous or unsafe practice which can result in personal injury or product or property damage.**

Installation Location

- **We recommend that this air conditioner be installed properly by qualified installation technicians in accordance with the Installation Instructions provided with the unit.**
- Before installation, check that the voltage of the electric supply in your home or office is the same as the voltage shown on the name plate.

WARNING

- **Do not install this air conditioner where there are fumes or flammable gases, or in an extremely humid space such as a greenhouse.**
- **Do not install the air conditioner where excessively hot heat-generating objects are located.**

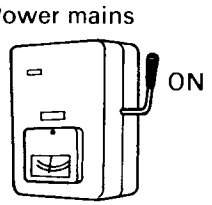
Avoid: To protect the air conditioner from heavy corrosion, avoid installing the outdoor unit where salty sea water can splash directly onto it or in sulphurous air near a spa.

Electrical Requirements

1. All wiring must conform to local electrical codes. Consult your dealer or a qualified electrician for details.
2. Each unit must be properly grounded with a ground (or earth) wire or through the supply wiring.
3. Wiring must be done by a qualified electrician.

CAUTION

To warm up the system, the power mains must be turned on at least five (5) hours before operation. Leave the power mains ON unless you will not be using this appliance for an extended period.



Safety Instructions

- **Read this booklet carefully before using this air conditioner. If you still have any difficulties or problems, consult your dealer for help.**
- **This air conditioner is designed to give you comfortable room conditions. Use this air conditioner only for its intended purpose as described in this Instruction Manual.**

WARNING

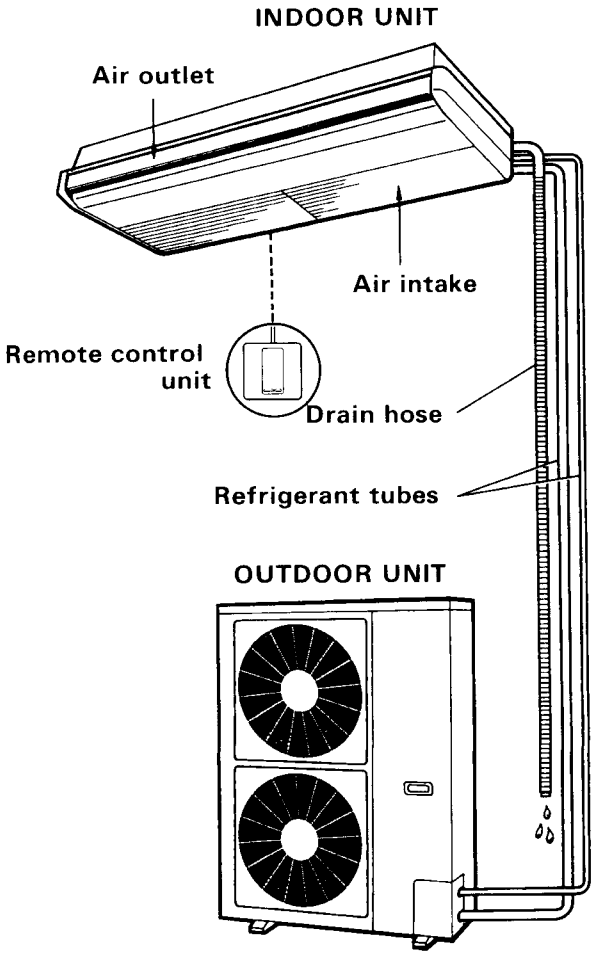
- **Never use or store gasoline or other flammable vapors or liquids near the air conditioner — doing so is very dangerous.**
- **This air conditioner has no ventilator for taking in fresh air from outdoors. You must open doors or windows frequently when you use gas or oil heating appliances in the same room, which consume a lot of oxygen from the air. Otherwise there is a risk of suffocation in an extreme case.**

CAUTION

- **Do not turn the air conditioner on and off from the power mains switch. Use the ON/OFF operation button.**
- **Do not stick anything into the air outlet of the air conditioner. Doing so is dangerous because the fan is rotating at high speed.**
- **Do not let children play with the air conditioner.**
- **Do not cool or heat the room too much if babies or invalids are present.**

Names of Parts

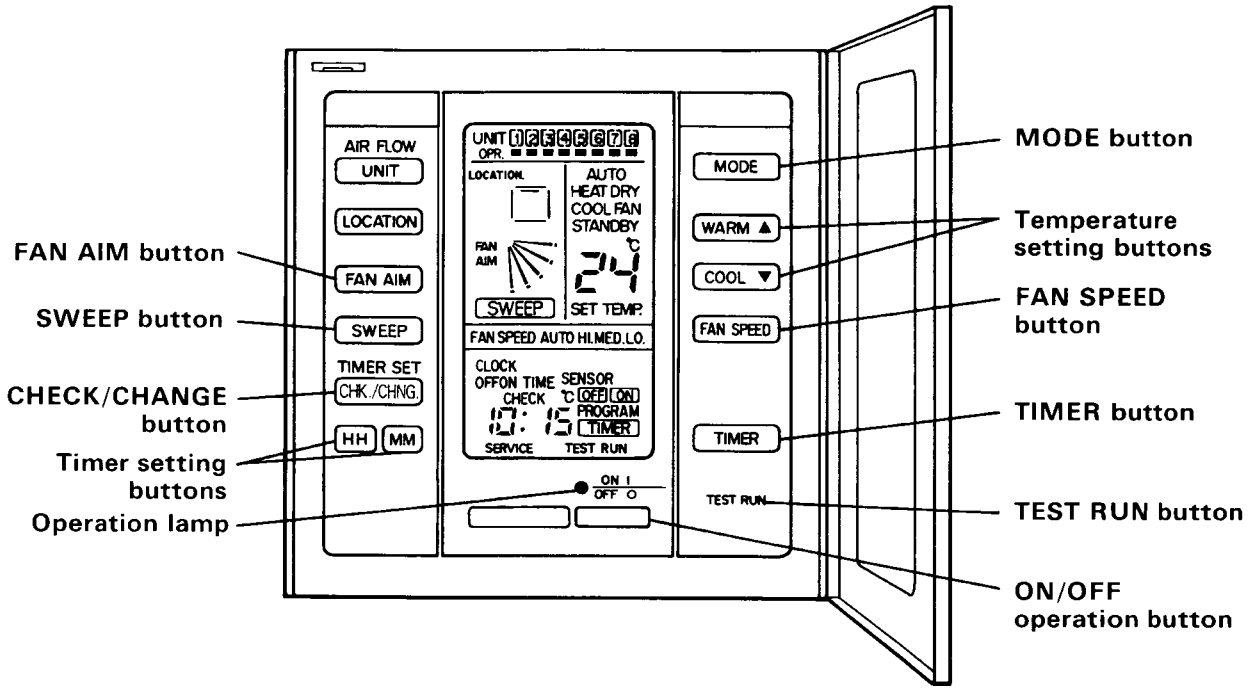
This air conditioner consists of an indoor unit and an outdoor unit.



NOTE This illustration is based on the external view of a standard model. Consequently, the appearance may differ from that of the air conditioner which you have selected.

Air outlet	Conditioned air is blown out of the air conditioner through the air outlet. The direction of airflow can be adjusted as desired using remote control unit.
Remote control unit	The wall mountable remote control unit consists of display and various control buttons.
Air intake	The air from the room is drawn into this section and passed through the air filters which remove dust.
Drain hose	Moisture in the room condenses and drains off through this hose.
Refrigerant tubes	The indoor and outdoor units are connected by copper tubes through which refrigerant gas flows.
Outdoor (condensing) unit	The outdoor unit contains the compressor, fan motor, heat exchanger coil, and other electrical components.

Remote Control Unit



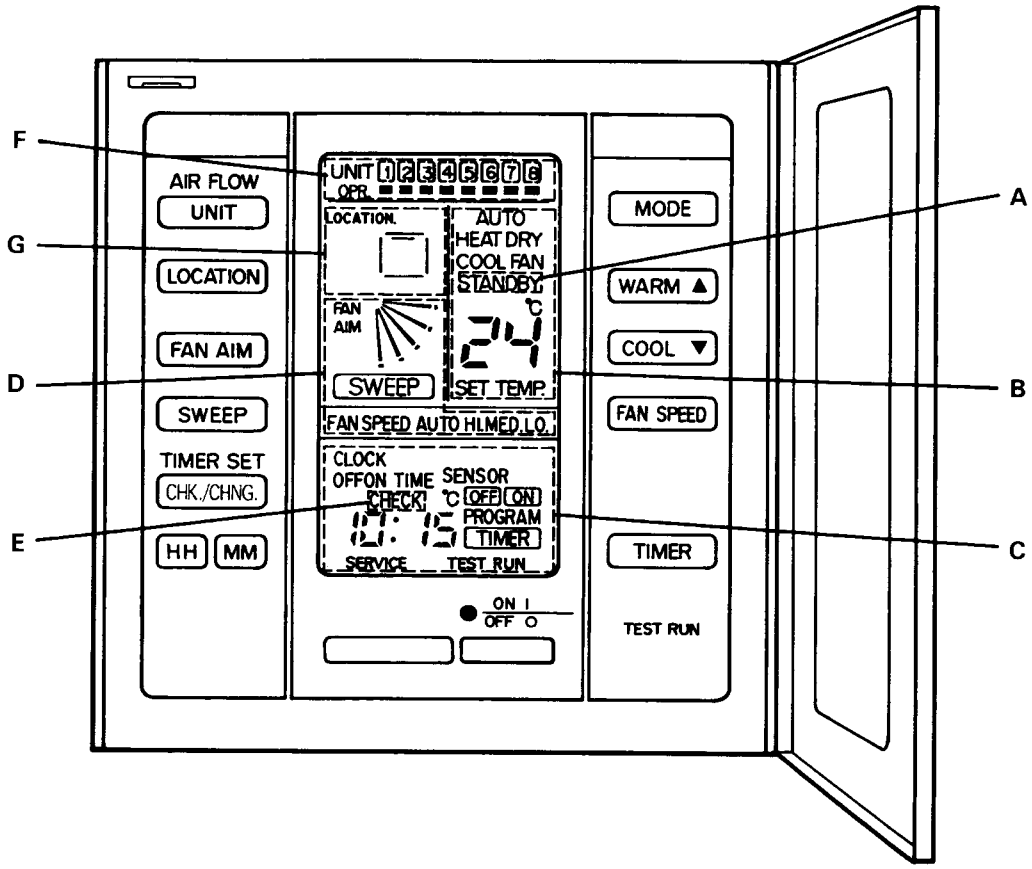
ON/OFF operation button	This button is for turning the air conditioner on and off.
Operation lamp	This lamp lights when the appliance is turned on.
MODE button	Use this button to select one of the following five operations: **AUTO:** Used to automatically set cooling or heating operation. (temperature range: 17 ~ 27°C) **HEAT:** Used for normal heating operation. (temperature range: 16 ~ 26°C) **DRY:** Used for dehumidifying without changing the room temperature. (temperature range: 18 ~ 30°C) **COOL:** Used for normal cooling operation. (temperature range: 18 ~ 30°C) **FAN:** Used to run the fan only, without the heating or cooling operation.
Temperature setting buttons	**WARM ▲** : Press this button to increase the set temperature. **COOL ▼** : Press this button to decrease the set temperature.
FAN SPEED button	**AUTO:** The air conditioner automatically decides the fan speed. **HI.** : High fan speed **MED.** : Medium fan speed **LO.** : Low fan speed
TIMER button	Use this button while the unit is operating to switch between timer settings. **TIMER OFF:** The air conditioner stops at the set time. **TIMER ON:** The air conditioner starts at the set time. **PROGRAM TIMER:** The air conditioner stops and starts, or starts and stops, at the set times every day.

Remote Control Unit (continued)

TEST RUN button  **CAUTION**	This button is used only when servicing the air conditioner. **Do not use the TEST RUN button for normal operation.**
FAN AIM button  **CAUTION**	Use this button to set the airflow direction* at a specific angle: * Airflow direction is displayed on the remote control unit. Operation mode — Number of airflow direction settings. COOL or DRY — 3 HEAT or FAN — 5 AUTO Cooling mode: — 3 Heating mode: — 5 • **In cool mode and dry mode, if the flaps are set in a downward position, condensation may form and drip around the vent.** • **Do not move the flap with your hands.**
SWEEP button	Use this button to make the airflow direction sweep to up and down automatically (airflow direction is displayed).
CHECK/CHANGE button	Use this button to change the time indication for the timer or real time clock. This button works regardless of whether the unit is turned on or off.
Timer setting buttons	**HH**: Press this button to set the "hours" indication for the timer or real time clock. **MM**: Press this button to set the "minutes" indication for the timer or real time clock.
UNIT button **NOTE**	When more than one indoor unit is connected, this button is used to select a unit when adjusting the airflow direction. (This button cannot be used when there is only one indoor unit and one outdoor unit.)
LOCATION button **NOTE**	Although the remote control unit has LOCATION button, this mode cannot be selected with this model.

5

Display (Remote Control Unit)



Description

A: When the unit is in the heating standby mode, the STANDBY indicator appears.

B: The currently selected operation mode is displayed.

C: When the unit is turned off, the current time is displayed.
When the unit is turned on, the current time and selected timer mode are displayed.

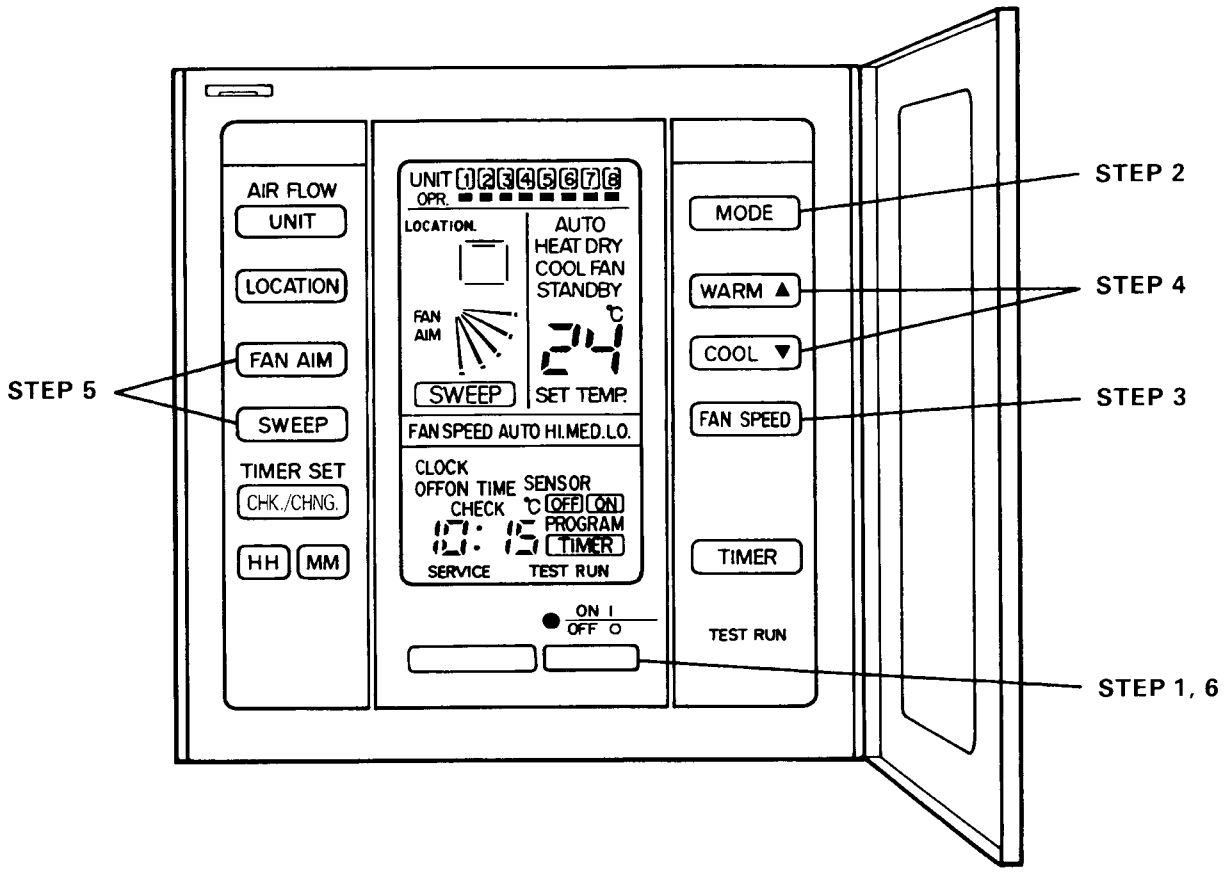
D: The currently selected FAN SPEED, FAN AIM and SWEEP are displayed.

E: This is displayed only if an abnormality occurs within a unit.

F: This indicates the number of indoor units connected when using group control.

G: Displays the position of the air outlet.

Operation



NOTE To warm up the system, the power mains must be turned on at least five (5) hours before operation.

STEP 1. **To start the air conditioner**
Press the operation button. (ON/OFF button)

STEP 2. **Setting the mode**
Press the MODE button to select the mode of your choice. (AUTO, HEAT, DRY, COOL or FAN)

STEP 3. **Setting the fan speed**
Press the FAN SPEED button to select the fan speed of your choice. (AUTO*, HI., MED. or LO.)
*If AUTO is selected, the fan speed switches automatically.

STEP 4. **Setting the temperature**
Use the COOL or WARM button as appropriate to change the temperature setting as desired.
(COOL reduces the temperature, and WARM increases the temperature.)

STEP 5. **Setting the airflow direction**
To adjust the airflow direction press either the FAN AIM or SWEEP button, as appropriate.
(Using the FAN AIM button to set the airflow direction, SWEEP button to circulate air.)

STEP 6. **To stop the air conditioner**
Press the operation button (ON/OFF button) again.

Special remarks

"DRY" Operation

How it works?

- Once the room temperature reaches the level that was set, the unit repeats the cycle of turning on and off automatically.
- In order to prevent the humidity in the room from rising again, the indoor fan also turns off when the unit stops operating.
- The fan speed is set to "LOW" automatically, and cannot be adjusted.
- "DRY" operation is not possible if the outdoor temperature is 15 °C or less.

Heating Operation

Heating performance

- Because this appliance heats a room by utilizing the heat of the outside air (heat pump system), the heating efficiency will fall off when the outdoor temperature is very low. If sufficient heat cannot be obtained with this heat pump, use another heating appliance in conjunction with this unit.

Defrosting

- When the outdoor temperature is low, frost or ice may form on the outdoor heat exchanger coil, reducing the heating performance. When this happens, a microcomputer-controlled defrosting system operates. At the same time, the fan on the indoor unit stops (or runs at very low speed in some cases) and the "STANDBY" indicator appears on the display until defrosting is completed. Heating operation then restarts after several minutes. (This interval will vary slightly depending upon the outdoor temperature and the way in which frost forms.)

"STANDBY" on the display

- For several minutes after the start of heating operation, the indoor fan will not start running (or it will run at very low speed in some cases) until the indoor heat exchanger coil has warmed up sufficiently. This is because a cold draft prevention system is operating. During this period, the "STANDBY" indicator remains displayed.
- "STANDBY" remains displayed during defrosting or when the compressor has been turned off (or when the unit is running at very low speed) by the thermostat when the system is in the heating mode.
- Upon completion of defrosting and when the compressor is turned on again, "STANDBY" will turn off automatically as the heating operation resumes.

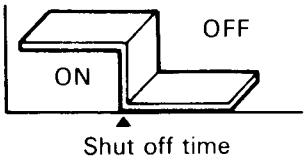
NOTE

Should the power fail while the unit is running

If the power supply for this unit is temporarily interrupted the unit will automatically resume operation (once the power is restored) with the same settings that were in effect before the power was interrupted.

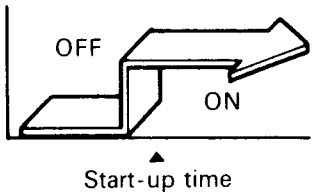
Setting the Timer

TIMER OFF



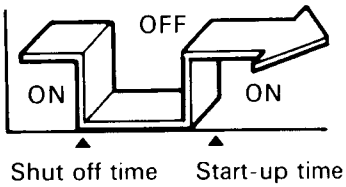
Use this mode to turn off the appliance automatically at the desired time.

TIMER ON



Use this mode to start the appliance automatically at the desired time.

PROGRAM TIMER



Use this mode to turn the appliance on and off automatically at the same set times every day.

NOTE Because this timer uses the actual time of day, be sure that the clock is set to the correct time.

How to set the present time

(Example) To set the time to 21:10

Operation		Indication
1. Press the CHK./CHNG. button to select CLOCK mode.	➡	The time indication alone flashes.
2. • Press the HH button until 21 is displayed. • Press the MM button until 10 is displayed.	➡	The display will automatically stop flashing (except for the ":" symbol) after 10 sec.

5

How to set the OFF timer

(Example) To stop the air conditioner at 23:30

Operation

1. Press the ON/OFF button to start the air conditioner.
2. Press the CHK./CHNG. button to select OFF TIME mode. ➡ The timer OFF and time indications flash.
3.
   - Press the HH button until 23 is displayed.
   - Press the MM button until 30 is displayed. ➡ The display will automatically change back to the present time after 10 sec.
4. Press the TIMER button to set the OFF timer.

Indication

How to set the ON timer

(Example) To start the air conditioner at 7:10

Operation

1. Press the ON/OFF button to start the air conditioner.
2. Press the CHK./CHNG. button to select ON TIME mode. ➡ The timer ON and time indications flash.
3.
   - Press the HH button until 7 is displayed.
   - Press the MM button until 10 is displayed. ➡ The display will automatically change back to the present time after 10 sec.
4. Press the TIMER button to set the ON timer.

Indication

NOTE When the ON timer is set, the unit enters the paused state. The operation lamp stays lit, indicating that the unit is waiting until the set time comes.

How to set the PROGRAM timer

(Example) To start operation at 7:10 and stop at 23:30

Operation

1. Set the TIMER ON/OFF times as shown in the above procedures.
2. Press the TIMER button to set PROGRAM (ON/OFF combination*).

* At this point, the setting (ON or OFF) that is closer to the current time is displayed; when that time comes, the next PROGRAM indicator (ON or OFF) is displayed.

- **Checking the timer setting**
  Each time the CHK./CHNG. button is pressed, the time display and the operation type change and the timer setting is displayed. After a pause, the display changes to the clock display.

Care and Cleaning

WARNING

For safety's sake, be sure to turn the appliance off and also to disconnect it from the power mains before cleaning it.
Do not pour water on the unit to clean it. This will damage the internal components and cause an electric shock hazard.

Indoor Unit

Casing and Grille

Clean the casing and grille of the indoor unit with a vacuum cleaner brush, or wipe them with a clean soft cloth.

If these parts are stained, use a clean cloth moistened with a mild liquid detergent. When cleaning the grille, be careful not to force the vanes out of place.

CAUTION

Never use solvents, or harsh chemicals. Do not wipe the plastic parts with very hot water.

Air filter

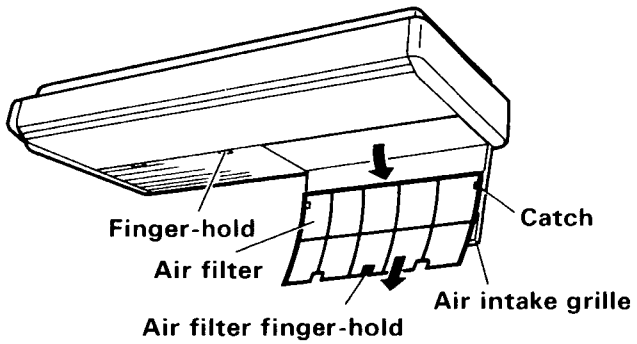
The air filter collects dust and other particles from the air and should be cleaned about once every six months. If the filter gets blocked, the efficiency of the air conditioner drops greatly.

NOTE

The frequency with which the filter should be cleaned depends on the environment in which the unit is used.

How to remove the filter

1. Take hold of the finger-hold on the air intake grille and press it to the rear, and the grille will open downward.
2. Take hold of the finger-hold on the air filter, first lift it and then pull it toward you to release it from the catch.



How to clean the filter

Use a vacuum cleaner to remove light dust. If there is sticky dust on the filter, wash the filter in lukewarm, soapy water, rinse it in clean water, and dry it.

Outdoor Unit

CAUTION

1. **Certain metal edges and the condenser fins are sharp and may cause injury if handled improperly; special care should be taken when you clean these parts.**
2. **Periodically check the outdoor unit to see if the air outlet or air intake is clogged with dirt or soot.**
3. **The internal coil and other components of the outdoor unit must also be cleaned periodically. Consult your dealer or service center.**

Care: After a Prolonged Idle Period

Check the indoor and outdoor unit air intakes and outlets for blockage; if there is a blockage, remove it.

Care: Before a Prolonged Idle Period

- Operate the fan for half a day to dry out the inside.
- Disconnect the power supply and also turn off the breaker.
- Clean the air filter and replace it in its original position.
- Outdoor unit internal components must be checked and cleaned periodically. Contact your local dealer for this service.

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5

Troubleshooting

If your air conditioner does not work properly, first check the following points before requesting service. If it still does not work properly, contact your dealer or a service center.

Trouble	Possible Cause	Remedy
Air conditioner does not run at all.	1. Power failure	1. Restore power.
	2. Leakage breaker has tripped.	2. Contact service center.
	3. Line voltage is too low.	3. Consult your electrician or dealer.
	4. Operation button is OFF.	4. Press the button again.
	5. The remote control unit or heat pump is malfunctioning. (ERROR and characters such as EI, PI, FI, etc. appear on the display.)	5. Consult your dealer.
Compressor runs but soon stops.	1. Obstruction in front of condenser coil	1. Remove obstruction.
Poor cooling (or heating) performance	1. Dirty or clogged air filter	1. Clean the air filter to improve the airflow.
	2. Heat source or many people in room	2. Eliminate heat source if possible.
	3. Doors and/or windows are open.	3. Shut them to keep the heat (or cold) out.
	4. Obstacle near air intake or air discharge port	4. Remove it to ensure good airflow.
	5. Thermostat is set too high for cooling (or too low for heating).	5. Set the temperature lower (or higher).
	6. (Outdoor temperature is too low).	6. (Try to use a back-up heater.)
	7. (Defrosting system does not work.)	7. (Consult your dealer.)
"CHECK" is displayed.	1. Trouble in wiring system	1. Contact service center.

Tips for Energy Saving

Avoid

- **Do not block the air intake and outlet of the unit. If either is obstructed, the unit will not work well, and may be damaged.**
- Do not let direct sunlight into the room. Use sunshades, blinds or curtains. If the walls and ceiling of the room are warmed by the sun, it will take longer to cool the room.

Do

- Always try to keep the air filter clean. (Refer to "Care and Cleaning".) A clogged filter will impair the performance of the unit.
- To prevent conditioned air from escaping, keep windows, doors and any other openings closed.

NOTE

Should the power fail while the unit is running

If the power supply for this unit is temporarily interrupted the unit will automatically resume operation (once the power is restored) with the same settings that were in effect before the power was interrupted.

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