EXES 5000

INTERCOM SYSTEM

TOA EXES-5000 INTERCOM SYSTEM

TROUBLE SHOOTING GUIDE

TOA
Sound &
Communications
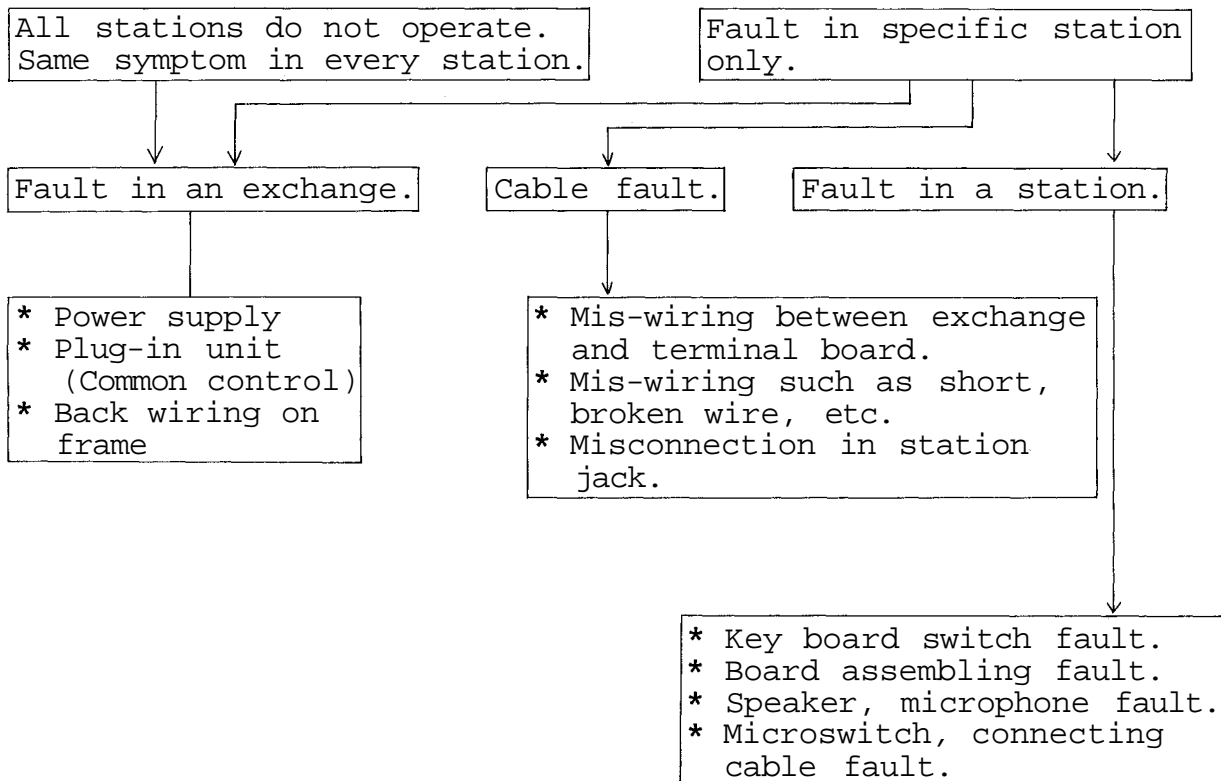
TOA ELECTRIC CO., LTD.

KOBE, JAPAN

8. TROUBLE SHOOTING GUIDE

Repairing of the EXES-5000 system is basically done by replacing defective units with good ones. The system's faults in an installation can be divided into the following categories.

1. Faults in an exchange

2. Faults in a station

3. Cable faults

To make system repairing easier, find which category is involved, then refer to the chart below for assistance in fault finding.
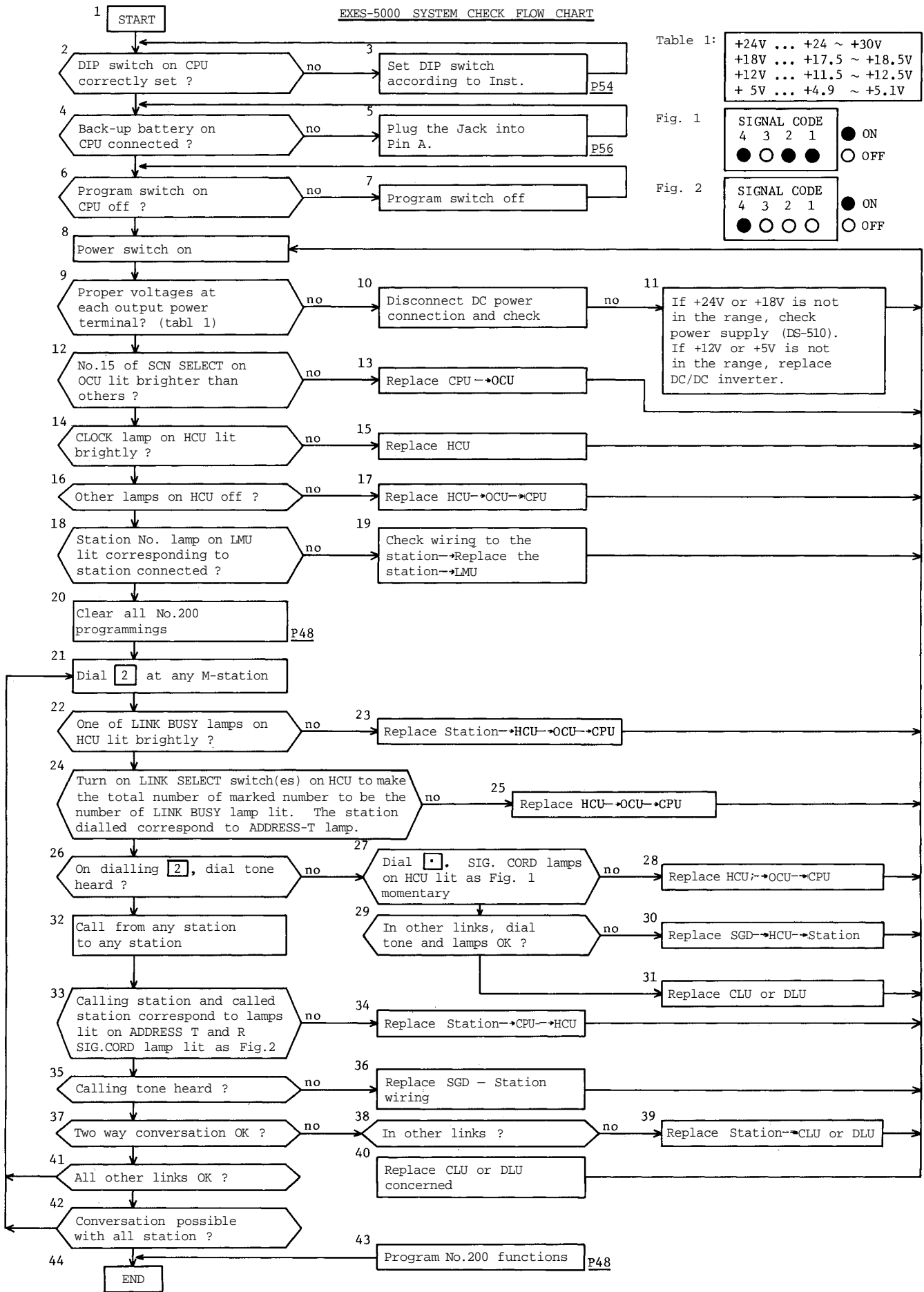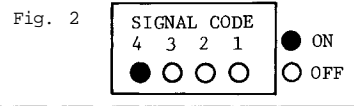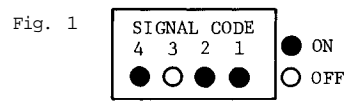
```
┌─────────────────────────────────┐   ┌─────────────────────────────┐
│All stations do not operate.     │   │Fault in specific station    │
│Same symptom in every station.   │   │only.                        │
└─────────────────────────────────┘   └─────────────────────────────┘

┌──────────────────────┐   ┌──────────────┐   ┌──────────────────────┐
│Fault in an exchange. │   │Cable fault.  │   │Fault in a station.   │
└──────────────────────┘   └──────────────┘   └──────────────────────┘

┌──────────────────────┐   ┌─────────────────────────────────┐
│* Power supply        │   │* Mis-wiring between exchange     │
│* Plug-in unit        │   │  and terminal board.            │
│  (Common control)    │   │* Mis-wiring such as short,      │
│* Back wiring on      │   │  broken wire, etc.              │
│  frame               │   │* Misconnection in station       │
└──────────────────────┘   │  jack.                          │
                           └─────────────────────────────────┘

                    ┌─────────────────────────────────┐
                    │* Key board switch fault.        │
                    │* Board assembling fault.        │
                    │* Speaker, microphone fault.     │
                    │* Microswitch, connecting        │
                    │  cable fault.                   │
                    └─────────────────────────────────┘
```

EXES-5000 SYSTEM CHECK FLOW CHART

1 START

2 DIP switch on CPU correctly set ? — no → 3 Set DIP switch according to Inst. P54

4 Back-up battery on CPU connected ? — no → 5 Plug the Jack into Pin A. P56

6 Program switch on CPU off ? — no → 7 Program switch off

8 Power switch on

9 Proper voltages at each output power terminal? (tabl 1) — no → 10 Disconnect DC power connection and check — no → 11 If +24V or +18V is not in the range, check power supply (DS-510). If +12V or +5V is not in the range, replace DC/DC inverter.

12 No.15 of SCN SELECT on OCU lit brighter than others ? — no → 13 Replace CPU —→OCU

14 CLOCK lamp on HCU lit brightly ? — no → 15 Replace HCU

16 Other lamps on HCU off ? — no → 17 Replace HCU—→OCU—→CPU

18 Station No. lamp on LMU lit corresponding to station connected ? — no → 19 Check wiring to the station—→Replace the station—→LMU

20 Clear all No.200 programmings P48

21 Dial 2 at any M-station

22 One of LINK BUSY lamps on HCU lit brightly ? — no → 23 Replace Station—→HCU—→OCU—→CPU

24 Turn on LINK SELECT switch(es) on HCU to make the total number of marked number to be the number of LINK BUSY lamp lit. The station dialled correspond to ADDRESS-T lamp. — no → 25 Replace HCU—→OCU—→CPU

26 On dialling 2, dial tone heard ? — no → 27 Dial ·. SIG. CORD lamps on HCU lit as Fig. 1 momentary — no → 28 Replace HCU;—→OCU—→CPU

32 Call from any station to any station

29 In other links, dial tone and lamps OK ? — no → 30 Replace SGD—→HCU—→Station

31 Replace CLU or DLU

33 Calling station and called station correspond to lamps lit on ADDRESS T and R SIG.CORD lamp lit as Fig.2 — no → 34 Replace Station—→CPU—→HCU

35 Calling tone heard ? — no → 36 Replace SGD — Station wiring

37 Two way conversation OK ? — no → 38 In other links ? — no → 39 Replace Station—→CLU or DLU

41 All other links OK ? 40 Replace CLU or DLU concerned

42 Conversation possible with all station ?

43 Program No.200 functions P48

44 END

Table 1:
+24V	+24 ~ +30V
+18V	+17.5 ~ +18.5V
+12V	+11.5 ~ +12.5V
+ 5V	+4.9 ~ +5.1V

Fig. 1 SIGNAL CODE 4 3 2 1 ● ON ○ OFF
● ○ ● ●

Fig. 2 SIGNAL CODE 4 3 2 1 ● ON ○ OFF
● ○ ○ ○

8-1. FAULT IN EXCHANGE

Before power supply check, confirm the following three points to eliminate elementary faults:

1. Is voltage selector set correctly?
2. Is AC power supplied?
3. Is power switch ON?

Start checking after disconnecting all wiring connected to DC output of the power supply unit.

SYMPTON	CHECK-ITEM	
Exchange does not operate.	All DC output voltages are correct.	* Over-current flows into one of plug-in units.
	All or one of DC output voltages are not correct.	* Fault in the power supply unit DS-510.
Abnormal voltage of +24V terminal.	Right range: +24 ~ +30V	* Replace AC and DC fuses. * Incorrect setting of the voltage selector. * Faulty power transformer.
Abnormal voltage of +18V.	Right range: +17.5 ∿ +18.5V	* Faulty 2SA-753. * Faulty μA7818KC.
Abnormal voltage of +5V or +12V.	Right range: +4.9 ∿ +5.1V +11.5 ∿ +12.5V	* DC/DC inverter (MIV-02) is defective.
Battery is not charged.	Check the current flowing into the battery. Right range: 80 ∿ 120mA	* Replace PCB of charging circuitry.
AC & DC operation lamps are OFF. Buzzer does not operate. Note: Only when DC power supply (Battery) is employed.	Check all DC voltage.	* Replace PCB of charging circuitry.
Blown AC and/or DC fuse.	All DC output voltages are correct. heck all stations involved in All-Call paging.	* Over-current flows into one of plug-in units. (Especially on +18V) * MIV-02 is defective. * Replace fuse according to the following.

| Number of stations	Fuse
0 ~ 30	DC 5A
31 ~ 64	DC 7A
65~	DC 10A

8-2. HOW TO FIND SHORT BETWEEN T-LINE AND R-LINE

If the shorted condition between T-line and R-line is not corrected for a long time, it may burn out the guard resistor (330Ω, 1/2W) on the LMU board. Therefore, find the shorted line according to the following procedure:

1. Turn off the privacy switch on all stations in the system.
2. Turn on the power switch of the system for several seconds, then, turn it off.
3. Watch the lamps on the LMU panels. The lamps on normal lines will go off after approximately 0.5 second. The lamps on the shorted lines will stay on more than 0.5 second.
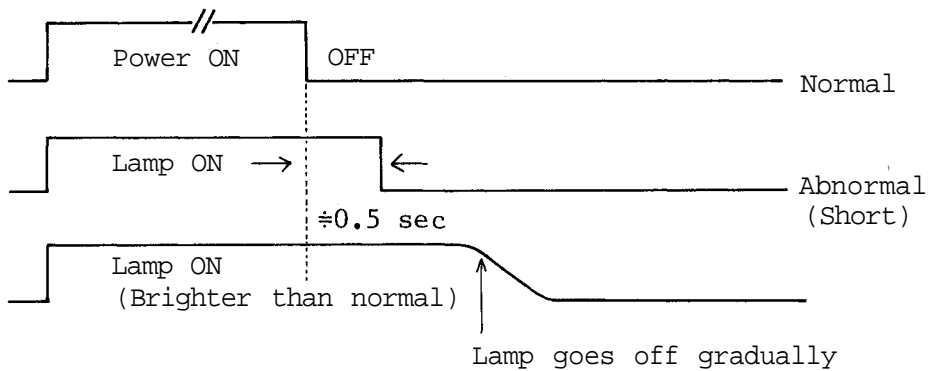
1. One of transmitting lines (T-Line) is disconnected.
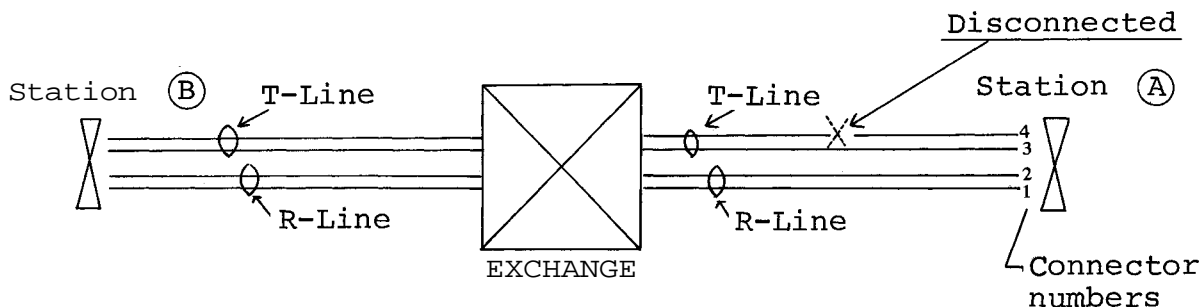
Symptom 1-1 A can make dialing.
         1-2 A can hear B .
         1-3 B can not hear A .
         1-4 Noise is heard at B .
         1-5 Noise increases at B when Press-To-Talk bar is
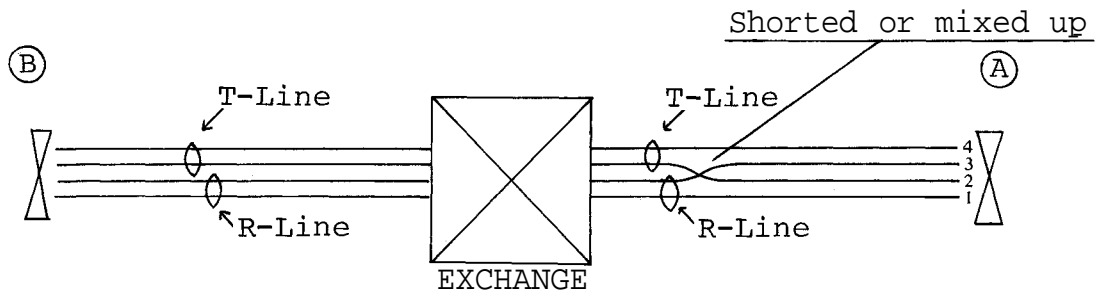   pressed at A .

LMU Lamps ----- Normal

2. One of receiving lines (R-Line) is disconnected.
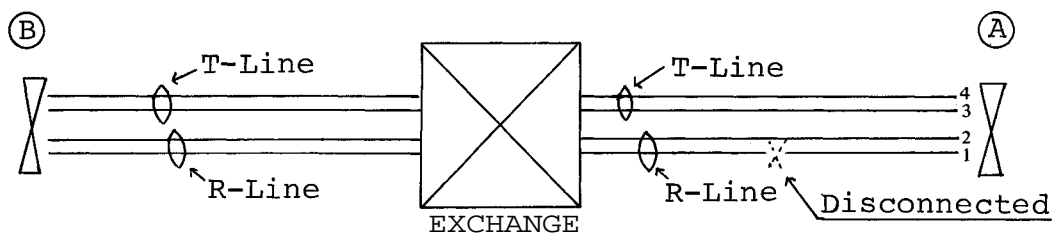
Sympton: 2-1 A can make dialing without dialing tone.
          2-2 When B dials A , busy tone or dial tone will be
   heard at B immediately after the calling tone.

LMU Lamps ----- Normal

3.   T-Line and R-Line are shorted or mixed up.

Shorted or mixed up

B   A

T-Line   T-Line

R-Line   R-Line

EXCHANGE

Symptom 3-1 A can not dial.
         3-2 Conversation is impossible between stations.
         3-3 When B dials A , noise will be heard at B
              immediately after the calling tone.

LMU Lamps ----- Brighter than normal.

4.   T-Line and R-Line are connected conversely.

B   A

T-Line   T-Line

R-Line   R-Line Conversed

EXCHANGE
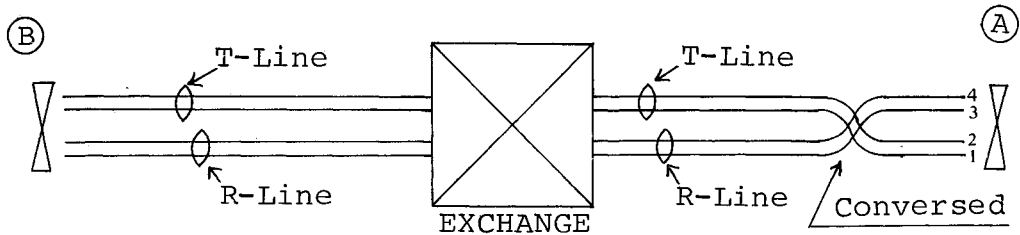
Sympton: 4-1 A can not make dialing.
          4-2 Conversation is impossible between stations.
          4-3 When B dials A , noise will be heard at B .

LMU Lamps ----- Brighter than normal.

8-3. FAULT IN SPECIFIC STATION ONLY

Find the cause according to the following table if the fault lies with a specific station only, not with all stations.

	CHECK-ITEM	CAUSE
Dialing can not be made at privacy off mode.	LMU Lamp is off.	* Disconnection of both T & R-Lines. * Guard resistor 330 Ω on LMU is burned out due to T & R-Lines short.
	Specific Lamp on LMU is brighter than normal.	* T & R-Lines are shorted.
	LMU Lamp is on in normal.	* Fault in the station. (Replace PCB board.)
Specific key does not operate.	Replace the station and make sure that the station is not faulty.	* Fault in key board switch or matrix circuitry. * Fault in the dial generator. (Replace PCB board.)
Calling tone can not be heard. Dialing tone can not be heard on dialing. Sound from the other party can not be heard.	Same sympton remains even if the station is replaced.	* Short or open in R-Line. * Fault in the demodulation circuitry on LMU. (Check LM-380, MT-547.)
	Becomes normal if the station is replaced.	* Disconnection of R-Line or improper connection of the station connector. * Fault in MT-547 on LMU. * Station fault.
Sound is not transmitted to the other party.	Same sympton remains even the station is replaced.	* Short or open in T-Line. * Fault in the modulation circuitry on LMU.
	Becomes normal if the station is replaced.	* Fault in MIC circuitry of the station. (Replace MIC or PCB)
On dialing, noise is heard by the called party.	Same sympton remains even the station is replaced.	* One of T-Lines is disconnected.
	Becomes normal if the station is replaced.	* Fault in MIC element. * Fault in T-Line of the station. * Low frequency oscillation of MIC AMP. (Faulty bypass capacitor)

Sound of the other party is broken during call.	Same symptom remains even the station is replaced.	* Adjust the volume control of station speaker if the room produces reverberation. (Lower the volume.) * Increase the gain of MIC AMP. * Replace PCB after checking if MIC unit is not touching its case.
Immediately after the calling tone, the line switches to cancel, busy, dial tone, etc.	Same symptom remains even the station is replaced.	* One of R-Lines is disconnected. * Fault in photo coupler PC-504 on LMU. * Fault in MT-547 on LMU or in the station.
	Becomes normal if the station is replaced.	* One of the R-Lines is disconnected or the station connector is not connected properly.

8-4. SPEECH AND FUNCTION TEST

1. Speech Test
    After completing the wiring check and the power supply
    and exchange test according to the system flow chart,
    the speech test for each station can then take place.

    ┌───┐
    │ IMPORTANT NOTE   │
    │ Before testing, all programming (Secretary transfer, │
    │ Master/Substation, Executive Priority Function) must │
    │ be cleared from station No.200 by turning on the PRO-│
    │ GRAM switch of the CPU, or the speech test can not   │
    │ proceed correctly.   │
    └───┘

    * Call every station one by one from any master station
      and examine the speech quality and sound volume.

    * The sound volume can be adjusted by the volume on the
      rear of the station. (Fully clockwise for maximum)

    * A call to a station in the room produces reverbera-
      tion and may present broken sound. Turn down the
      volume of the station speaker until the sound becomes
      normal.

    * Each station must be located properly where no feed-
      back will occur between station and external speakers.
      The gain adjustment of the paging amplifier is also
      important in order to avoid troublesome feedback.

    * The Press-To-Talk bar on the station keyboard must be
      used for the speech test when stations are installed
      in high noise areas (more than 60dB noise).

    * Speech quality (broken sound, natural conversation,
      tone quality, etc.) must be tested with each line in
      the CLU or DLU employed in the system.

2. Function Test

   * Check all employed functions with a few stations near
     the exchange.

   * Check "User Programmable Functions" at stations in-
     volved after the programming from station 200.

      + Secretary Transfer: Is transfer made correctly
                            with the privacy switch on
                            at the executive station.

      + Master/Substation : Touch dial $\boxed{0}$ at substation
                            can call its master station.

      + Executive Priority: Is this function operated at
                            stations involved.

   * Use all number keys including $\boxed{C}$ and $\boxed{\cdot}$, Press-
     To-Talk bar, Vol. L/H and privacy switch to test
     all functions.

      EXAMPLE: + Both calling and conversation tests with
                  station number 200 through 209.
                + Change the position of Vol. L/H and make
                  sure that the switch works.
                + Turn the privacy switch ON. Is privacy
                  tone heard from the station when some-
                  one calls?

MEMO

MEMO

TOA
Sound &
Communications

TOA ELECTRIC CO., LTD.
KOBE, JAPAN