

**INTERCOM 6000**  
**TM6008R01/TM6016R01/TM6032R01**

**Service Manual**  
**TM6000D21**

2002



**KROMA TELECOM**

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## SAFETY INFORMATION

**WARNING:** This product includes critical mechanical and electrical parts which are essential for X-Radiation safety. For continued safety replace critical components indicated in the service schematic only with exact replacement parts given in the parts list of service Manual. Operating high voltage for this product is 16 Kv. At minimum brightness. Refer to service manual for measurement procedures and proper service adjustments.

**WARNING:** Electric shock or fire hazard can be caused if critical components are replaced by non conform components. Refer to parts list of service manual.

**CAUTION:** High vacuum tube is dangerous to handle refer replacement to qualified personnel. Replace with a tube of the same type for continued safety.

## **PREFACE**

The User's and Service Manual describes the **KROMA** Model TB6000 Talback System. Information is divided into two basic parts:

- User Manual
- Service Manual

The User's Manual, encompassing section 1, 2, 3 and 4 is in its own volume with the intent that it may be self contained. It may also be combined to form an integral part of the Service Manual. The Service Manual starts with section 5.

NOTE: **KROMA** RESERVES THE RIGHT TO INTRODUCE MODIFICATION FROM TIME TO TIME WITHOUT UPDATING THIS HANDBOOK.

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## **1. INTRODUCTION**

### **1.1. INTRODUCTION**

The present Intercom System is the result of years of experience by **KROMA** in TV Broadcast and Teleproduction areas.

**KROMA** TB-6000 Intercom System represents a significant improvement in Intercom Systems with considerable reduction in System size and installation complexity.

Human engineering has been designed into the TB-6000 along with state-of-the-art components to provide maximum reliability and functionality.

Four standard Matrix configurations are available and experience has shown that with these a flexible system such as the TB-6000 can meet the majority of customer requirements. They are:

TM6008, 8x8 Central Matrix  
TM6016, 16x16 Central Matrix  
TM6032, 32x32 Central Matrix

Several comprehensive systems can be interconnected to build a communications network. A comprehensive system from very small to very large can be custom ordered. Our goal is to provide you, the customer, with the right product and accessories for your application.

### **1.2. FEATURES**

- \* 4 wire operation.
- \* Electronically balance input and outputs.
- \* Speed plan and priorities easily reprogrammable with a PC.
- \* Multiple audio control levels
- \* Electronically latching or Hold - to - Talk keys.
- \* LED status indication on switches.

### 1.3. TECHNICAL SPECIFICATIONS

#### 1.3.1. Central Matrix, TM60XX

##### Input

Nominal level + 6 dBV  
Maximum level + 18 dBV  
Impedance >10 K ohms  
Common mode rejection > 65 dB

##### Input/Output

Gain  $0 \pm 1$  dB  
Frequency Response 100 Hz to 10 KHz,  $\pm 0.5$  dB  
Distortion  $\leq 0.1$  %, 100 Hz to 10 KHz

##### Output

Impedance  $\leq 150$  ohms  
Signal / Noise Ratio > 65 dB  
Crosstalk < 65 dB

External Interface RS-232C

Power Requirements 110/220 VAC,  $\pm 10$  %  
50 / 60 Hz

Power Consumption < 20 VA (TM-6008)  
< 30 VA (TM-6016)  
< 50 VA (TM-6032)

#### 1.3.2. Audio and Control Modules

See the user manuals reference: UM6000D02, UM6000D03 and UM6000D04.

Notice: All specifications subject to change without notice.

## 2. GENERAL DESCRIPTION

### 2.1. TM60XX MATRIX

The TB6000 series is based around central switching matrices. Three standard Matrix configurations are available: TM6008- 8 x 8 Central Matrix, TM6016- 16 x 16, TM6032- 32 x 32 Central Matrix. Each Matrix contains a series of dedicated plug-in modules housed in rack frames. The system contains one microprocessor control card for each 8 x 8, and 16 x 16 Central Matrix. Two microprocessor control cards are required for each 32 x 32 Central Matrix.

All matrix contain three basic board components which are: Crosspoint cards, Buffer Amplifier cards, and the Microprocessor Control card. The Buffer amplifier cards adapt the impedance of the input lines to the crosspoints. The switcher modules achieve routing by solid state crosspoints. The microprocessor board controls the Input/Output crosspoints. The 8 x 8, 16 x 16, and 32 x 32 matrices contain their own power supply.

The system has been designed from its inception to provide total flexibility to configure a system to the specific requirements of a customer. Therefore, it will be necessary for each customer to fill out a system configuration form. This will provide **KROMA** with complete information of the interconnections required. **KROMA** will then supply EPROMS for the required system.

#### 2.1.1. Functional Description of the 8 x 8 Central Matrix

The TM6008 is contained in a 1RU high rack frame, 19" wide containing:

- \* Power Supply. This plug in unit supplies the necessary voltages for only one 8 x 8 matrix.
- \* Buffer Amplifier Card.(Internal Card). Each 8 x 8 matrix contains one Buffer Card with 8 Input/Output Lines.
- \* Crosspoint cards (Switcher Cards). Each 8 x 8 matrix contains one crosspoint cards. Each card consists of eight basic 8 x 1 switching matrices and eight output stages to make the signals symmetrical before sending to the output pairs.
- \* Microprocessor Control card- controls crosspoints, and associated areas.
- \* Self-contain power supply.

### **2.1.2. Functional Description of the 16 x 16 Central Matrix**

The TM6016 is contained in a 1RU high rack frame 19" wide containing:

- \* Power Supply. This plug in unit supplies the necessary voltages for only one 16 x 16 matrix.
- \* Buffer Amplifier Card.(Internal Card). Each 16 x 16 matrix contains one Buffer Card with 16 Input/Output Lines.
- \* Crosspoint cards (Switcher Cards). Each 16 x 16 matrix contains one crosspoint cards. Each card consists of sixteen basic 16 x 1 switching matrices and sixteen output stages to make the signals symmetrical before sending to the output pairs.
- \* Microprocessor Control card- controls crosspoints, and associated areas.
- \* Self-contained power supply.

### **2.1.3. Functional Description of the 32 x 32 Central Matrix**

The description for the TM6032 is basically the same as the TM016 with the following exceptions:

The TM6032 is contained in a 2R4 high rack frame 19" wide containing:

- 4 Crosspoint Cards
- 2 Buffer Amplifier Cards (Internal Card)
- 2 Microprocessor Cards
- 1 Self-contained Power Supply

## **2.2. TM60XX PERSONALITY CONFIGURATION**

In order to configure the TM60xx it will be necessary for the customer to complete the following forms depending upon which configuration is required.

Form A1, and A5 are required for the TM6008 configuration and are shown in figures 1 and 2

Form A2, and A6 are required for the TM6016 configuration and are shown in figures 3 and 4

Form A3 and A7 are required for the TM6032 configuration and are shown in figures 5 and 6

- Figure 1: Form A1

- Figure 2: Form A5

- Figure 3: Form A3

- Figure 4: Form A6

- Figure 5: Form A3

- Figure 6: Form A7

### 2.2.1. Map Configuration

The following information must be filled in on the printed System Configuration forms required for your particular system.

A. NUMBER/TYPE- Fill in to numbers/characters to define size/type of outstation

B. TALLY CTRL- Fill in yes/no (Y/N) if the outstation is fed with Tally signal.

If yes, A5, A6 and A7 forms must be filled out per every outstation with Tally signal, according to the size of the matrix.

C. EXT- Fill in yes/no (Y/N) if the outstation is supplied with an External Line Module EL6000.

D. 2nd MX. ACC.- Fill in yes/no (Y/N) if the terminal is fed with a EO6000 Second Matrix Access option card.

E. SOURCE- Fill in the input source for every input number. A maximum of 8 characters can be used.

F. CROSSPOINTS- For every input with an associated terminal, the type of crosspoints along with the outputs must be indicated at the intersection of the input/output as follows:

X NORMAL (TALK): Unidirectional routing from source to selected destination.

2 WAY (TALK & LISTEN): Bidirectional routing allowing 2 way communication between source and selected destination.

● FIXED: Permanent unidirectional routing from source to destination.

⊙ STAND-BY: Permanent unidirectional routing from source to destination with the ability to temporarily override this with another routing selected by an authorised source.

▲ REMOTE (TALK): Unidirectional routing from source to destination selected from a third outstation.

\* REMOTE (TALK & LISTEN): Bidirectional routing allowing 2-way communication between the source and destination, selected from a third outstation.

▼ LISTEN: Unidirectional routing selected from a destination.

### G. SPECIAL FUNCTION

TALLY: There are 16 different levels for the control of crosspoints from a tally signal which is applied to individual outstations.

DIRECT CONTROL: An interface units allows the matrix to be controlled by contact closures, external to the intercom system.

Conversely, it allows an outstation to control external devices via relay contacts. Up to 64 inputs and outputs can be accomodated in blocks of 16 within a 1 UR 19" frame.

NOTE : Terminals, belt-packs, cameras, etc. are simultaneously inputs and outputs. Therefore, the same reference has to be used in the input and output calls in normal situations, although in special cases they could be different.

## 2.3. CONTROL PANEL TP6008/TP6024

See the User Manuals UM6000D04 for more information about this control panels.

## 2.4. TERMINALS AP6000 AND CP6032 MODULES

### 2.4.1. General

Terminal Station requires 2 RU's height of space in a standard half rack width panel. It contains its own microprocessor (s). One cable pair carries the data and control signals. There is one standard type: the CP6032 (32 keys).

The terminals contain software design to generate special unique features such as momentary latching switch action, present memories, etc.

Each button on the keyboard contains a green LED. It is activated when a preselection is generated or when these keys enable the audio signal to be sent or received.

See the User Manuals UM6000D02 and UM6000D03 for more information about this control panels.

### **2.4.2. Funtional Description**

Each unit consists of the following:

- Analogue Circuit- Provides clear commnication with full range frequency response and 2.5 watts RMS of distortionless audio via send and return from the matrix. The included microphone with AGC keeps the voice at a suitable level.
- Power Supply- Self contained unit supplies necessary voltages.
- Keyboard Circuit- Attached to the front panel is the keypad wich may contain 32 keys. Also, included on the front panel is the selected multiple call selector and call adder.
- Microprocessor Circuit- Provides local control along with Matrix access.

### **2.5. 6 LINE/4 WIRE ADAPTOR, CE6000**

This unit is designed to provide the best possible coupling between the Beltpack or other 4 wire equipment and the **KROMA** Intercom System. Up to six Beltpacks can be handled by this adaptor.

The incoming and outgoing signals in the CE6000 are symmetrical.

The CE6000 voltage is supplied from the matrix or external line module and also provides power to the beltpack.

### **2.6. BELTPACK, BP6000**

The communication from or to the beltpacks is passed to the Matrix or External Line Module thus allowing each beltpack in the system to talk with every station or single communication with only one.

The headphone volume may be independently adjusted. The beltpack has been built to stand abuse.

Each beltpack can be connected to the matrix via a terminal connector or via the CE6000 or to an External Line Module.

### **2.7. EXTERNAL LINE PANEL EL6000**

This panel provides facilities for two dedicated external inputs/outputs (e.g. lines, Belt-Packs, Radio Links, etc.) with mute, volume and external controls.

### **2.8. TELEPHONE LINE PANEL HN6000**

This panel provides facilities for one dedicated external telephone line with line access, volume and external controls.

### **3. INSTALLATION**

#### **3.1. GENERAL**

The steps necessary to assemble and install the talkback system are as follows:

- Unpacking and Inspection
- Card frame mounting and loading
- Input/Output Connections

#### **3.2. UNPACKING**

Each Talkback System is tested, inspected and found free of defects prior to shipment. Carefully inspect all equipment for damage.

Most of the equipment will be packed in its own individual box. Do not destroy packing materials and boxes until all equipment is installed and functioning properly.

#### **3.3. POWER REQUIREMENTS**

The A.C. mains of the Talkback System is wired as ordered for either 110, 220 VAC  $\pm 10\%$  50/60 Hz.

#### **3.4. EQUIPMENT RACK MOUNTING**

With the exception of the Beltpack and the Adaptor, the Matrix will be mounted in the standard 19 inch rack equipment cabinets.

Terminals can be rack mounted with a 19" Rack Mount Adaptor Kit for mounting half width units such as the CP6032, AP6000 etc.

#### **3.5. TM6008 - CIRCUIT BOARD LOCATIONS**

Figure 7 shows the locations of the PC cards, with its corresponding power supply, within the 8 x 8 Central Matrix.

Figure 8 shows the rear panel location of the various interconnections.

Figure 7: TM6008 front.



Figure 8: TM6008 rear.



**3.6. TM6016 - CIRCUIT BOARD LOCATIONS**

Figure 9 shows the locations of the PC cards, with its corresponding power supply within the 16 x 16 Central Matrix.

Shown in figure 10 is the rear panel interconnection layout of the 16 x 16 Central Matrix.

Figure 9: TM6016 front.

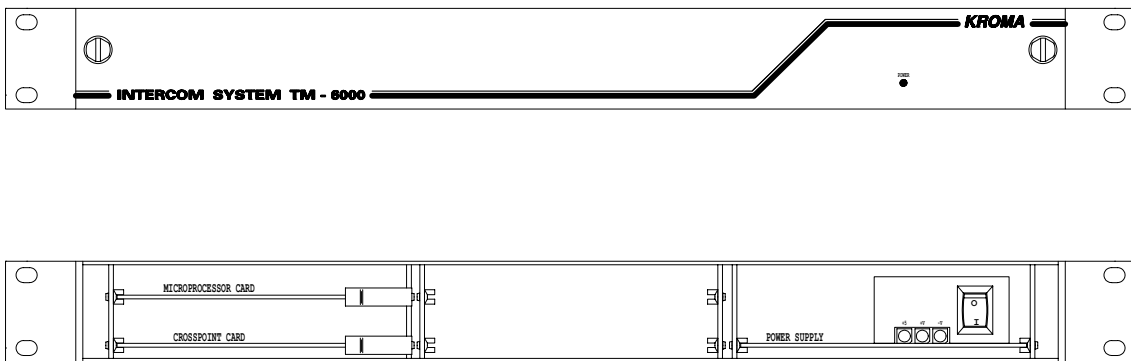
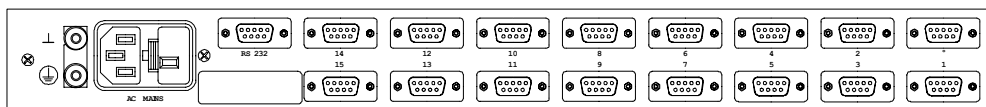


Figure 10: TM6016 rear.



### 3.7. TM6032 - CIRCUIT BOARD LOCATIONS

The 32 x 32 Central Matrix is mounted in a 2 RU high frame as is shown in figure 11 . The frame contains 2 Buffer Amplifier Cards, 4 Crosspoint Cards, 2 Microprocessor Cards and the Power Supply Module.

Shown in figure 12 are the rear panel I/O connectors, RS-232C connector, ground system, Mains fuse and AC Mains input-socket.

Also shows the input/output designations on the connector.

Figure 11: TM6032 front.

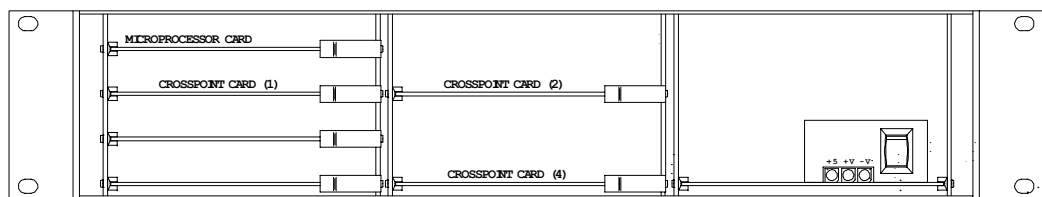
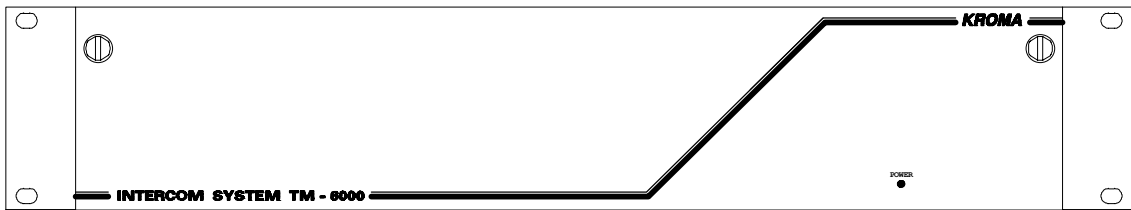
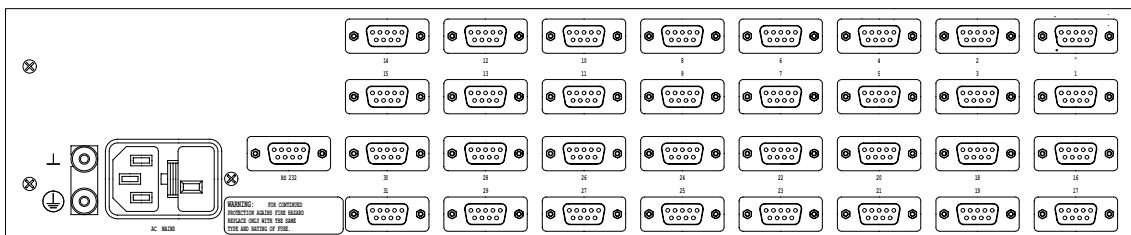


Figure 12: TM6032 rear.



**3.8. CP6032 CONTROL PANEL MODULE**

See the User Manuals UM6000D03 for more information about this control panels.

**3.9. AP6000 AUDIO PANEL MODULE**

See the User Manuals UM6000D02 for more information about this audio panels.

**3.10. TP6008/TP6024 INTEGRATED AUDIO&CONTROL PANEL MODULES**

See the User Manuals UM6000D04 for more information about this integrated panels.

**3.11. EL6000 - EXTERNAL LINE MODULE**

Figure 13 shows the front panel of the EL6000 with the physical locations of all controls.

Figure 14 shows the rear panel with the locations of the link connectors and external line connectors.

Figure 13: EL6000 front.

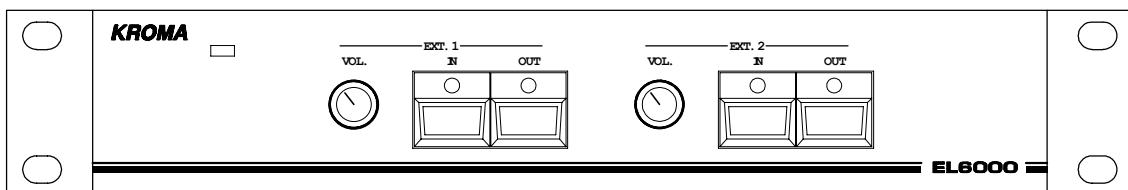
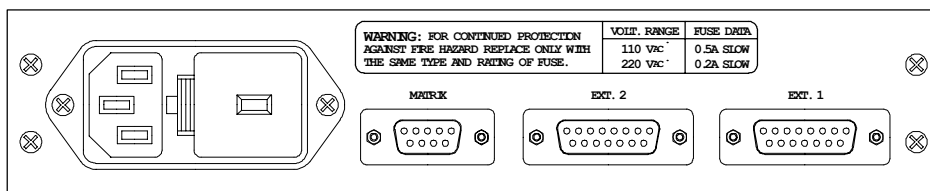


Figure 14: EL6000 rear.



**3.12. HN6000 - EXTERNAL LINE MODULE**

Figure 15 shows the front panel of the HN6000 with the physical locations of all controls.

Figure 16 shows the rear panel with the locations of the link connectors and external line connectors.

Figure 15: HN6000 front.

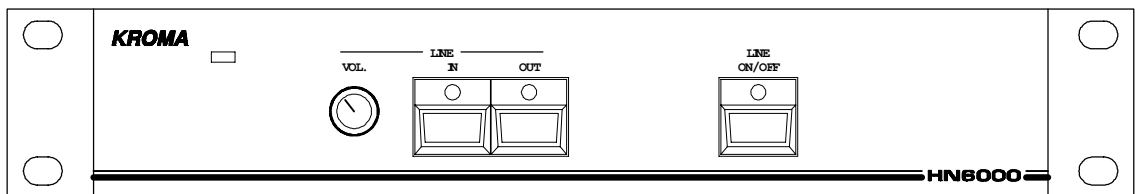
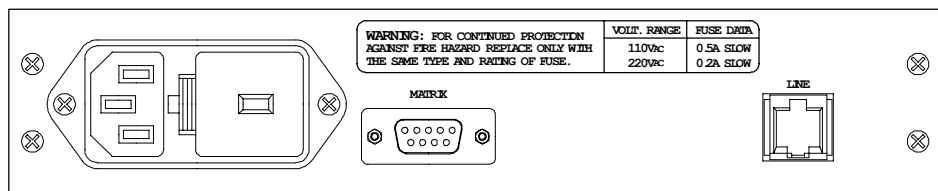


Figure 16: HN6000 rear.



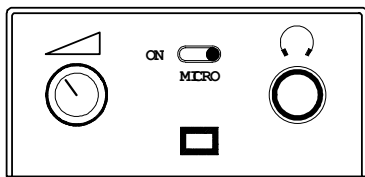
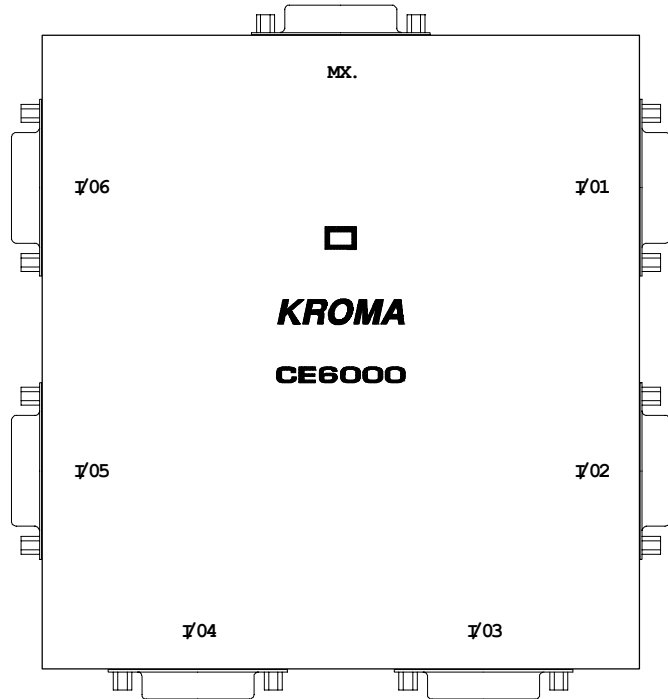
**3.13. BELTPACK, BP6000**

Figure 17 shows the rugged beltpack unit. This unit has been designed for continuous use. It is compact and versatile. Practical operating features include a volume control, headset jack, microphone mute and connector to CE6000 adaptor or TM60XX Matrix.

Figure 17: BP6000.



Figure 18: CE6000



**3.14.6 LINE/4 WIRE ADAPTOR, CE6000**

The 6 Line/4 wires adaptor is shown in figure 18. The adaptor can handle six beltpacks. The output from the adaptor is then sent to the Matrix, or EXT Lines.

**3.15.INPUT/OUTPUT INTERCONNECTIONS**

Figure 19 :Shows the interconnection for use between the TM60XX and BP6000.

CONT.	MATRIX SUBD 9 MALE	PIN TO PIN	CONT.	DIN 7 270 FEMALE
1	DATA LINK -		1	AUDIO OUT TO MATRIX +
2	DATA LINK +		2	ANALOG GROUND
3	GROUND	3-2	3	AUDIO IN FROM MATRIX +
4	AUDIO IN FROM TERM. -	4-4	4	AUDIO OUT TO MATRIX -
5	AUDIO IN FROM TERM +	5-1	5	AUDIO IN FROM MATRIX -
6	+V	6-7	6	-V
7	AUDIO OUT TO TERM. -	7-5	7	+V
8	AUDIO OUT TO TERM +	8-3		
9	-V	9-6		

Cable reference: 7x0.11 max. length 50 mts.

Figure 20 :Shows the interconnection for use between the CE6000 or EL6000 and BP6000 .

CONT.	SUBD 15 MALE	PIN TO PIN	CONT.	DIN 7 270 FEMALE
1	AUDIO IN FROM TERM +	1-1	1	AUDIO OUT TO MATRIX +
3,4	GROUND	3,4-2	2	ANALOG GROUND
12	AUDIO OUT TO TERM +	12-3	3	AUDIO IN FROM MATRIX +
2	AUDIO IN FROM TERM. -	2-4	4	AUDIO OUT TO MATRIX -
11	AUDIO OUT TO TERM. -	11-5	5	AUDIO IN FROM MATRIX -
6	-V	6-6	6	-V
5	+V	5-7	7	+V

Cable reference: 7x0.11 max. length 50 mts.

Figure 21 :Shows the interconnection for use between the TM60XX and AP6000/CP6032/TP6008/TP6008.

CONT.	MATRIX SUBD 9 MALE	PIN TO PIN	GROUP	CONT.	TERMINAL SUBD 9 FEMALE
1	DATA LINK -	1-1	A	1	DATA LINK -
2	DATA LINK +	2-2	A	2	DATA LINK +
3	GROUND	3-3	A	3	ANALOG GROUND
4	AUDIO IN FROM TERM. -	4-4	B	4	AUDIO OUT TO MATRIX -
5	AUDIO IN FROM TERM +	5-5	B	5	AUDIO OUT TO MATRIX +
6	+V	3-6	B	6	DIGITAL GROUND
7	AUDIO OUT TO TERM. -	7-7	C	7	AUDIO IN FROM MATRIX -
8	AUDIO OUT TO TERM +	8-8	C	8	AUDIO IN FROM MATRIX +
9	-V	3-9	C	9	ANALOG GROUND

Cable reference: COMELDAT TP (D) V 3x2x0.38

Figure 22: Shows the interconnection for use between the TM60XX and EL6000/HN6000.

CONT.	MATRIX SUBD 9 MALE	PIN TO PIN	GROUP	CONT.	TERMINAL SUBD 9 FEMALE
1	DATA LINK -	1-1	A	1	DATA LINK -
2	DATA LINK +	2-2	A	2	DATA LINK +
3	GROUND	3-3	A	3	ANALOG GROUND
4	AUDIO IN FROM TERM. -	4-4	B	4	AUDIO OUT TO MATRIX -
5	AUDIO IN FROM TERM +	5-5	B	5	AUDIO OUT TO MATRIX +
6	+V	3-6	B	6	DIGITAL GROUND
7	AUDIO OUT TO TERM. -	7-7	C	7	AUDIO IN FROM MATRIX -
8	AUDIO OUT TO TERM +	8-8	C	8	AUDIO IN FROM MATRIX +
9	-V	3-9	C	9	ANALOG GROUND

Cable reference: COMELDAT TP (D) V 3x2x0.38

Figure 23: Shows the interconnection for use between the TM60XX and the CE6000.

CONT.	MATRIX SUBD 9 MALE	PIN TO PIN	GROUP	CONT.	CE 6000 SUBD 15 FEMALE
4	AUDIO IN FROM CE6000 -	4-2	A	1	AUDIO OUT TO MATRIX +
5	AUDIO IN FROM CE6000 +	5-1	A	3,4	GROUND
3	GROUND	3-3,4		12	AUDIO IN FROM MATRIX +
7	AUDIO OUT TO CE6000 -	7-11	B	2	AUDIO OUT TO MATRIX. -
8	AUDIO OUT TO CE6000 +	8-12	B	11	AUDIO IN FROM MATRIX. -
6	+V	6-5	C	6	-V
9	-V	9-6	C	5	+V

Cable reference: COMELDAT TP (D) V 3x2x0.38

Figure 24 :Shows the link required to interconnect AP6000 modules with CP6032.

CONT.	AP6000 SUBD 25 FEMALE	PIN TO PIN	CONT.	CP6032 SUBD 25 MALE
1	DATA +	1-1	1	DATA +
14	DATA -	14-14	14	DATA -
6	GROUND	6-6	6	GROUND

Figure 25 :Shows the link required to interconnect AP6000 modules with CP6032 with EO6000 option.

CONT.	AP6000 SUBD 25 FEMALE	PIN TO PIN	CONT.	CP6000 SUBD 25 MALE
1	DATA +	1-1	1	DATA +
14	DATA -	14-14	14	DATA -
6	GROUND	6-6	6	GROUND

CONT.	CP6032 SUBD 25 MALE	PIN TO PIN	CONT.	AP6000 SUBD 9 FEMALE
15	AUDIO IN -	15-4	4	AUDIO OUT -
17	AUDIO IN +	17-5	5	AUDIO OUT +
21	AUDIO OUT +	21-8	8	AUDIO IN +
25	AUDIO OUT -	25-7	7	AUDIO IN -
3	GROUND	3-9	9	GROUND

Figure 26 :Shows the link required to interconnect TM60XX with the PC for the map configuration software.

CONT.	TM60XX SUBD 9 FEMALE	PIN TO PIN	CONT.	PC SUBD 9 FEMALE
2	RX	2-2	2	TX
3	TX	3-3	3	RX
5	GROUND	5-5	5	GROUND

Figure 27 :Shows the link required to interconnect EL6000 and a external audio source.

CONT.	EL6000 SUBD 15 MALE	GROUP
1	AUDIO IN TO EL6000 +	A
3,4	GROUND	A,B,C
2	AUDIO IN TO EL6000. -	A
11	AUDIO OUT FROM EL6000 +	B
12	AUDIO OUT FROM EL6000 -	B
6	-V	C
5	+V	C

## 4. OPERATION

### 4.1. GENERAL

There is one standard module, the CP6032 which contains 32 Keypad buttons.

### 4.2. MULTIPLE CALL

Multiple calls can be made from outstations in the TB6000 system using the  $\Sigma$  and  $S\Sigma$  Keys in conjunction with the required destination keys. This multiple call configuration is held in the outstation memory for immediate use.

#### 4.2.1. Operational Example

- a. To initiate a Multiple call press the  $S\Sigma$  key. The yellow LED will be illuminated continuously.
- b. Select the desired destination keys. The green LED will be illuminated in all keys selected.
- c. Press the  $S\Sigma$  key when the selection has been completed.
- d. Pressing  $\Sigma$  will illuminate a green LED continuously in all keys selected. The communication will then be allowed.
- e. To terminate a call depress  $\Sigma$ . The green LED illuminated will go to its off state.

In this way the multi call information will not be lost or affected by other individual calls.

- f. To cancel this information, press  $S\Sigma$ , and then depress each individual illuminated green key. Once again, depress  $\Sigma$ .

### 4.3. EXTERNAL SIGNALS

#### 4.3.1. EL6000 operation

- a. Two dedicated external Input/Output lines (EXT 1 and EXT 2) can be fed to the External Line module EL6000 for use with wireless interfaces, telephone lines, etc.
- b. Located on the front panel are two keys labeled OUT. Depressing either one of these two keys will send the associated external output signal.
- c. Also, located on the front panel are the IN keys. When these keys are depressed the associated audio input will be attenuated.
- d. The audio input level is controlled by the volume control on the front panel.

#### 4.3.2. HN6000 operation

- a. One dedicated external telephone Input/Output line (LINE) can be fed to the Telephone Line.
- b. Located on the front panel there is a key labeled OUT. Depressing one of this key will send the associated output signal.
- c. Also, located on the front panel there is the IN key. When this key is depressed the associated audio input will be attenuated.
- d. The access to the telephone line is controlled by the LINE ON/OFF key.
- e. The audio input level is controlled by the volume control on the front panel.

### 4.4. KEY USE

Key function in one of two ways.

- a. SIMPLE LOCK - Depress and release to talk. Depress once again to break the circuit.
- b. PUSH-TO-TALK - Depress and maintain until communication has been completed. Time duration is a minimum of one second.

This function is not available in all the type of terminals.