TS612

Multi-Line, On-Air Telephone System

Installation & Operations Manual

GENTNER

Perfect Communication through Technology, Service, and Education™

TS612 Installation and Operations Manual
Gentner Part No. 800-003-000
July 1999 (Rev. 3.0)

This equipment complies with the requirements of the EU guidelines:

89/336/EEC	"Electromagnetic Compatibility"
73/23/EEC	"Electrical operating material for use within specific voltage limits"

Conformity of the equipment with the above guidelines is attested by the CE mark.

98/482/EC   "Single terminal connection to the public switched telephone network (PSTN)"

Table of Contents

1ntroduction

Congratulations on purchasing the TS612 multi-line telephone system. The TS612 interfaces telephone calls to your audio equipment, providing superior analog telephone integration into broadcast applications. Ease of use, quick installation, and versatility have made the TS612 one of the most popular telephone interface systems in the broadcast industry today.

The TS612 features two internal digital hybrids, providing high-quality interface to six telephone lines (expandable to 12). The dual hybrids allow the TS612 to operate as a single-studio telephone system able to conference up to four callers simultaneously, or a two-studio system able to conference two callers to each studio.

This manual gives instructions on installation, set up, and operation of the TS612. It also helps you resolve technical problems, should any arise.

For more information, please contact Gentner Communications. We welcome and encourage your comments so we can continue to improve our products and serve your needs.

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What's In This Manual

The manual is divided into the following sections:

"Overview" is a basic introduction to the TS612.

"Installation" explains how to install the TS612 in a professional setting. Detailed diagrams and descriptions will help you decide on the best configuration settings for the needs of your environment.

"Setup and Operation" describes how to use the TS612 on a day-to-day basis. It also contains information on how to set up the control surfaces.

"Glossary" defines some of the industry-standard terminology as well as other terms that you will find throughout this manual.

"Appendices" include additional information such as schematics, connector pinouts, and serial communications protocol.

For additional help on how to install, set up, or operate the TS612 system, please contact Gentner:

Sales and Customer Service
Telephone: 1.800.945.7730 (USA) **or** 1.801.975.7200
Fax: 1.800.933.5107 (USA) **or** 1.801.977.0087
e-mail: bcastinfo@gentner.com

Technical Support
Telephone: 1.800.283.5936 (USA) **or** 1.801.974.3760
Fax: 1.801.974.3638
e-mail: tech1@gentner.com

Gentner Communications Corporation
www.gentner.com
1825 Research Way, Salt Lake City, UT 84119

Unpacking

Please check that the following was received with your shipment:
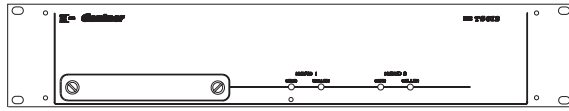
TS612 Mainframe
Part 850-003-006

AC Power Cord
Part 699-150-006
(domestic)
International power cord provided
with international TS612
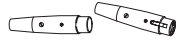
XLRs
One male, One female
**Parts 664-600-003
and 664-500-003**
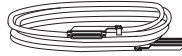
25-foot Telephone
Cable
Part 830-000-025
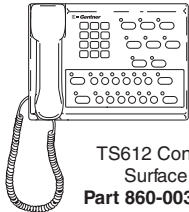
TS612 Control
Surface
Part 860-003-200

Direct Plug-In Power
Transformer
Part 830-003-203

25-foot Control
Surface Cable
Part 830-003-025
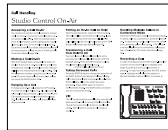
TS612 Operations
Quick Reference Card
Part 800-003-003

TS612 Installation and
Operations Manual
Part 800-003-000

! **Gentner Communications
is not responsible for prod-
uct damage incurred during
shipment. You must make claims
directly with the carrier. Inspect
your shipment carefully for obvious
signs of damage. If the shipment
appears to be damaged, retain the
original boxes and packing material
for inspection by the carrier.
Contact your carrier immediately.**

Warranty Instructions

Please register your TS612 online by visiting Gentner Technical Support
on the World Wide Web at **www.gentner.com**. When your product is
properly registered, Gentner Communications will be able to serve you
better should you require technical assistance. Warranty information will
also be used to notify you of upgrades, new product information, etc.

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2Overview

The TS612 is a multi-line telephone system with a separate mainframe and control surface. The mainframe contains two internal digital hybrids which provide high-quality interface to six telephone lines (expandable to 12). The dual hybrids allow the TS612 to operate as a single-studio telephone system able to conference up to four callers simultaneously, or a two-studio system able to conference two callers to each studio.

Off-Air Telephone Use

The TS612 operates off-air like a standard multi-line telephone system. Using the control surface, outgoing and incoming calls can be placed and answered in complete privacy, even while other calls are on hold and on-air.

On-Air Telephone Use

Once connected, any call can be placed on-air at the touch of a button. Special features such as Screen, Next, and VIP, enable you to make sure that the right call goes on-air at the right time.

Dedicated Screening Station

The TS612 supports a dedicated call-screening control surface. An off-air screener takes incoming calls and places them in a screened-hold queue. The on-air talent or producer may press any line to put it on-air. To automatically place a call on-air from the top of the screened hold queue the on-air talent simply presses the Next button.

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About Version 2.5.3

Firmware version 2.5.3 introduces user-selectable capabilities including split-caller mode, split-hybrid mode, previous-hold, two-button hold, and two-button off, and screener air control. These and others features will be discussed in detail later on in the manual.

Split-Caller Mode
You can use the TS612 as a single studio system and bring each of the hybrid outputs independently to the audio console with a single feed for both hybrids.

Split-Hybrid Mode
Like Split-Caller Mode, you can bring each hybrid out to the console independently. However, you can return independent feeds for each hybrid in Split-Hybrid Mode.

Previous-Hold
This mode places calls on hold automatically when you select another line. You can switch between previous-hold mode and traditional line switching (with automatic disconnect) via the control surface.

Two-Button Hold
With Two-Button Hold you can place a single call on hold when two or more lines are conferenced together.

Two-Button Off
This mode allows you to disconnect any line by pressing the Off button followed by the line button you wish to disconnect.

Screener Air Control
When enabled, this mode allows the screening control surface to place calls to and from air.

Operational Requirements

Telephone Line Requirements

The TS612 requires analog (POTS) telephone lines or analog extension lines from a PBX that fully emulates analog lines (loop-start plus battery).

For the best performance, Gentner Communications recommends that you connect directly to telephone-company provided POTS lines, rather than PBX extensions.

To simplify TS612 installation with POTS lines, request that your telephone company provide lines with an RJ21X connector (wired according to the pinout table on page 11). If your telephone company provides only individual lines with RJ11C connectors, an RJ11 interface panel may be ordered from Gentner (part number 676-550-001). If you plan to loop through the TS612 to your business-telephone system, make sure you have the loop-extension cable prewired to prevent disruption to your business telephone service.

If you use analog extensions of your business PBX, use a separate extension for each telephone-line input at the TS612. Remember that these lines cannot contain digitized audio or telephone-set control signals. The TS612 (handset) can transfer calls to another PBX extension provided the PBX extension supports hook flash commands.

If you are uncertain whether the your PBX extensions are analog, a good (although not infallible) test is to connect to an external modem or fax machine. If the modem or fax operates correctly, the line will probably work with the TS612. To set up analog loop-start extensions for the TS612, contact your PBX system provider.

Power Requirements

The TS612 mainframe will accommodate 85–240 Vac, 50–60 Hz and uses 30 watts of power maximum, in accordance with the supplied power module. International customers should request that the dealer provide a molded power cord (grounded) with the appropriate plug.

The TS612 control surface will accommodate 12 Vdc 500 mA, in accordance with the supplied power module. The supplied wall adapter operates on 117 Vac unless your dealer ordered the 220 Vac version.

Equipment Placement

The TS612 mainframe fits a standard 19-inch equipment rack.

! **Do not block ventilation holes when installing the mainframe in a19-inch equipment rack.**

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3 Installation

Telephone Line Setup

The TS612 connects to six or 12 telephone lines, depending on your hardware configuration. The basic configuration supports six lines. For instructions on installing the expansion cards to increase TS612 capacity to 12 lines, see page 12.

Telephone Connections

Six or 12 telephone lines may be connected to the each of the mainframe's two 50-pin Centronix connectors (RJ21X). *Phone Lines In* is a male connector. *Phone Lines Out* is a female connector.

Connecting six or 12 telephone lines to the *Phone Lines Out* connector on the mainframe enables the loop-out function of the TS612. Lines not in use by the TS612 are then available for use on a separate telephone system.

Phone Line	Pin	Wire Color*	Pin	Wire Color*
1	1 TIP	blue/white	26 RING	white/blue
2	2 TIP	orange/white	27 RING	white/orange
3	3 TIP	green/white	28 RING	white/green
4	4 TIP	brown/white	29 RING	white/brown
5	5 TIP	silver/white	30 RING	white/silver
6	6 TIP	blue/red	31 RING	red/blue
7	7 TIP	orange/red	32 RING	red/orange
8	8 TIP	green/red	33 RING	red/green
9	9 TIP	brown/red	34 RING	red/brown
10	10 TIP	silver/red	35 RING	red/silver
11	11 TIP	blue/black	36 RING	black/blue
12	12 TIP	orange/black	37 RING	black/orange
*Wire colors are presented in the following format: base/stripe				

! **To prevent electrical shock or possible equipment damage, disconnect the unit from all electrical power before proceeding.**

Line Expansion

A six line TS612 is shipped from the factory configured for six telephone lines. You may expand a six line system to 12 lines by adding two additional telco cards. Cards must be installed in sets of two in order for the system to function properly. Once line expansion is completed, lines 7–12 are active on your control surface.

Follow the step-by-step instructions below to ensure proper installation of additional Telco cards:

1) Remove the top cover of the mainframe chassis by loosening four screws; two on each of the mainframe side panels. Lift the top off carefully.

2) Find the two empty PCB card slots. They are located on the left-hand side of the mainframe when it is viewed from the front.

Card Guide
(Telco Channel
Extender)

Expansion
Card Slots

TOP VIEW
TS612 Mainframe Assy
(Top Cover Removed)

FRONT
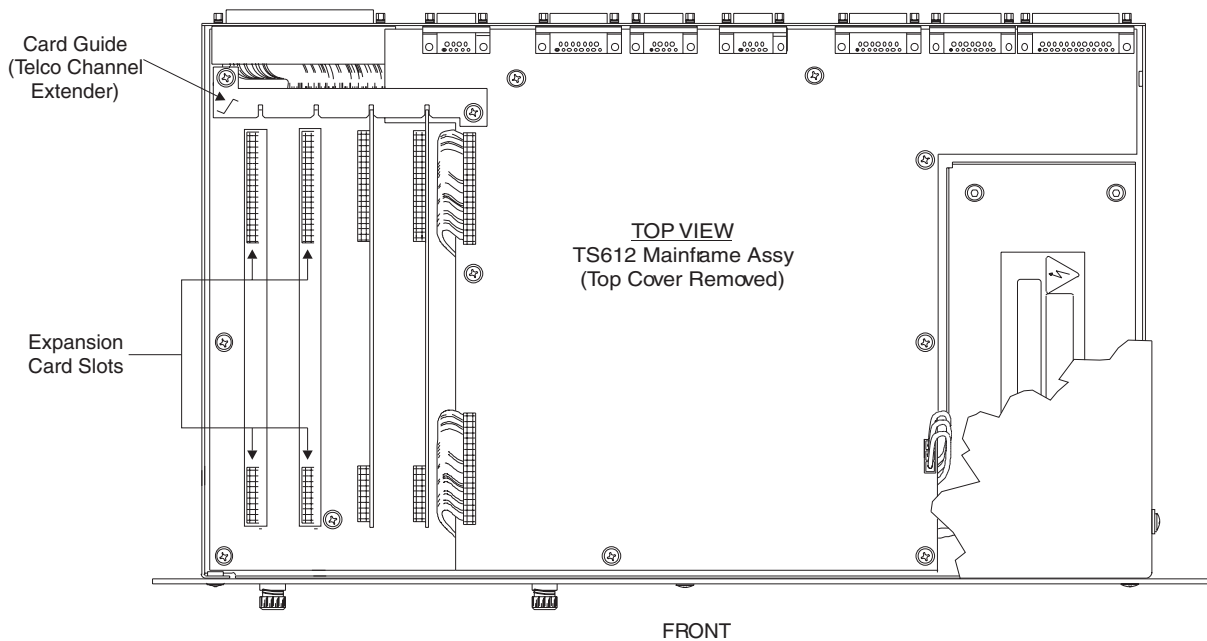
3) Carefully insert the two expansion cards into the two expansion slots. Either card can be placed in either slot. Be careful that the cards are inserted correctly. The component side of the PCB must be toward the left side of the chassis, the same as previously installed cards. Press down gently to make certain the cards are seated completely.

4) Place the top chassis cover back onto the mainframe and tighten the four screws.

5) Reconnect the mainframe to your power source.

Configuring the TS612

To best suit your requirements, the TS612 may be configured in several ways. The type of configuration is determined by the positions of the DIP switches located behind the access panel on the front of the mainframe. Unscrew the two large screws on the front of the main frame and remove the access panel to change DIP switch settings.
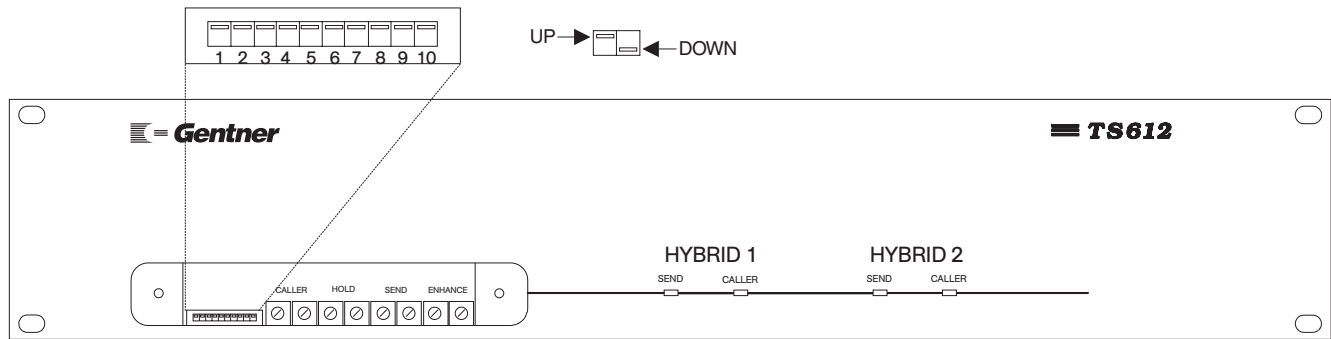
The table below indicates the configuration mode associated with each DIP switch. DIP switches 1, 3, 6, and 7 affect TS612 configuration directly and are discussed below in relation to the possible configurations. Other DIP switches are discussed later in the manual.

Dip Switch	Description	Up Position	Down Position
1	Mainframe Operation	Single	Split Studio
2	Open Collector Outputs	Momentary	Latching
3	Mix-Minus	Internal	External
4	COM Port Operation	Standard Control	Network Interface
5	Not Active		
6	Split Caller	Off	On
7	Split Hybrid	Off	On
8	Loop Override	Off	On
9	Aux Inputs	Momentary	Latching
10	Operating Mode	Operational	Setup

The TS612 may be used as a single-studio or dual-studio system. In a single-studio setting, the TS612 operates as a dual-hybrid telephone system, with up to 12 lines and three control surfaces: main/studio 1, aux/studio 2, and screener. The main/studio 1, aux/studio 2 control surfaces have parallel control of all on-air functions.

Main/Studio One   Studio Console

TS612
Mainframe

Screener   Aux/Studio Two

Optional
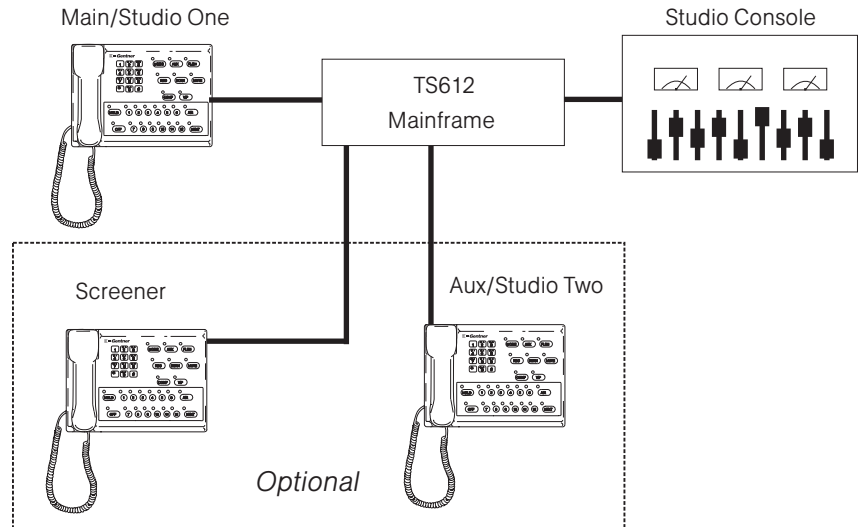
In a dual-studio setting, the TS612 operates as two single-hybrid telephone systems. A dual-studio system must have the 12-line expansion installed or switch #4 activated to operate. As a split-studio configuration, lines 1−6 and hybrid 1 are dedicated to studio 1, and lines 7−12 and hybrid 2 are dedicated to studio 2 unless switch 4 is activated in which case lines 1−12 are shared by both studios. The studio control surfaces operate independently of each other, while the screener control surface can screen lines for either studio. The configurations for single-studio and dual-studio systems are discussed in detail on the following pages.

Main/Studio One   Aux/Studio Two

TS612
Mainframe

Studio Console   Studio Console

Common
Screener
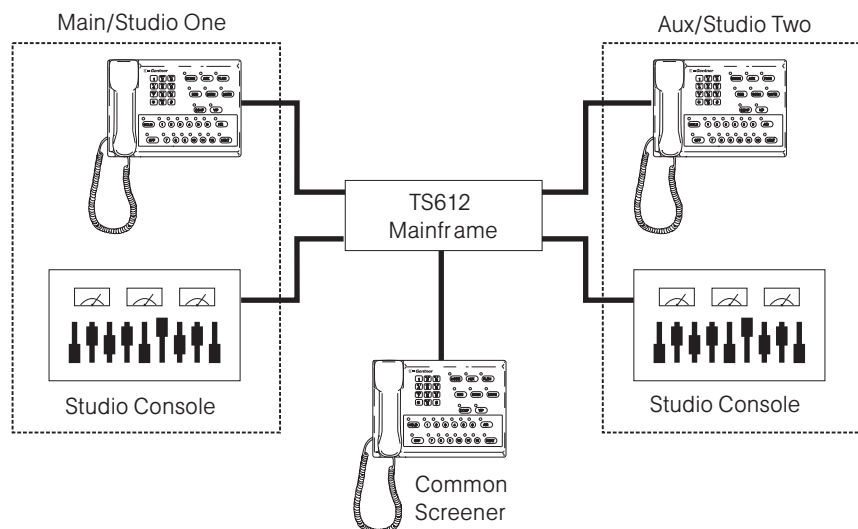
Single-Studio Mixed Caller

In mixed-caller mode, all calls placed to air are routed to the audio console through the Main Caller output regardless of which hybrid a call is routed through. Each of the TS612's two hybrids has two call slots. This allows up to four calls to be placed to air simultaneously by conferencing them together.

Main Caller Output
(callers 1–4)

Mix Minus or
Program audio

Studio Console
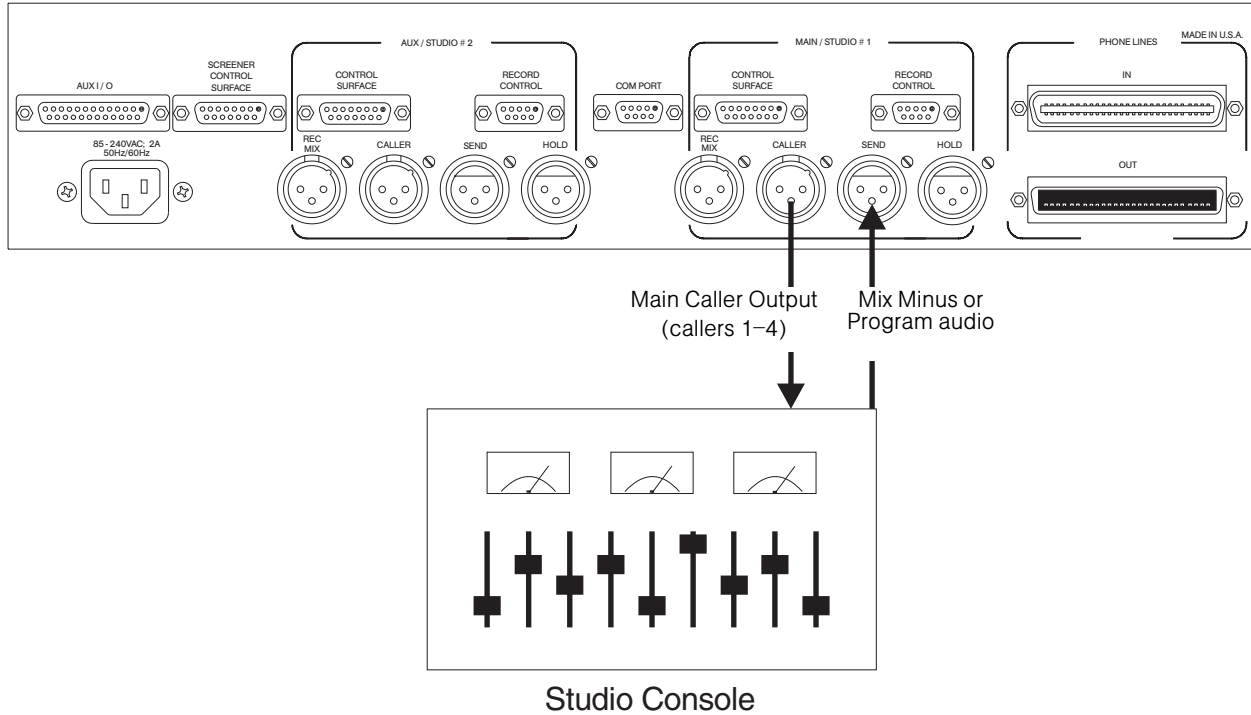
DIP Switch Settings. For mixed-caller mode, DIP switch 1 should be up. DIP switch 3 determines the mix-minus setup for the configuration. If DIP switch 3 is in the up position, the TS612's internal mix-minus feature is active. Full program audio (including the caller audio) may be routed to the Main Send input. Caller audio will be removed by the TS612 before transmitting the signal back to the caller.

If DIP switch 3 is in the down position, external mix-minus must be provided. Caller audio must be removed from the program mix before routing the signal to the Send input.

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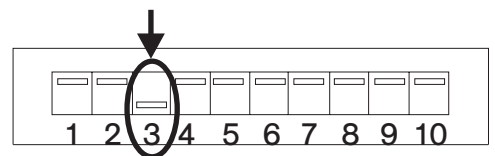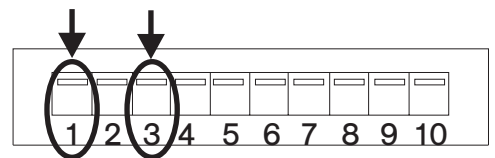
Order Calls are Placed into Conference	Hybrid / Slot	Caller Output
1	H1 / S1	Main
2	H2 / S1	Aux
3	H2 / S2	Aux
4	H1 / S2	Main

Single-Studio Split Caller

In split-caller mode when conference mode is enabled, caller audio is routed to the audio console through both Caller outputs (Main and Aux) as shown in the diagram below. The advantage of split-caller mode is that caller audio is separated into two audio signals that may be connected to separate inputs on your audio console. Calls are routed to the hybrids (placed on-air) in the order they are added to the conference. See the table on the right for more information. Hybrid 1 audio is routed to the Main Caller output. Hybrid 2 audio is routed to the Aux Caller Output.

Studio Console
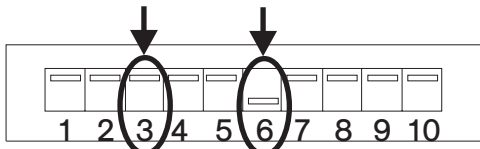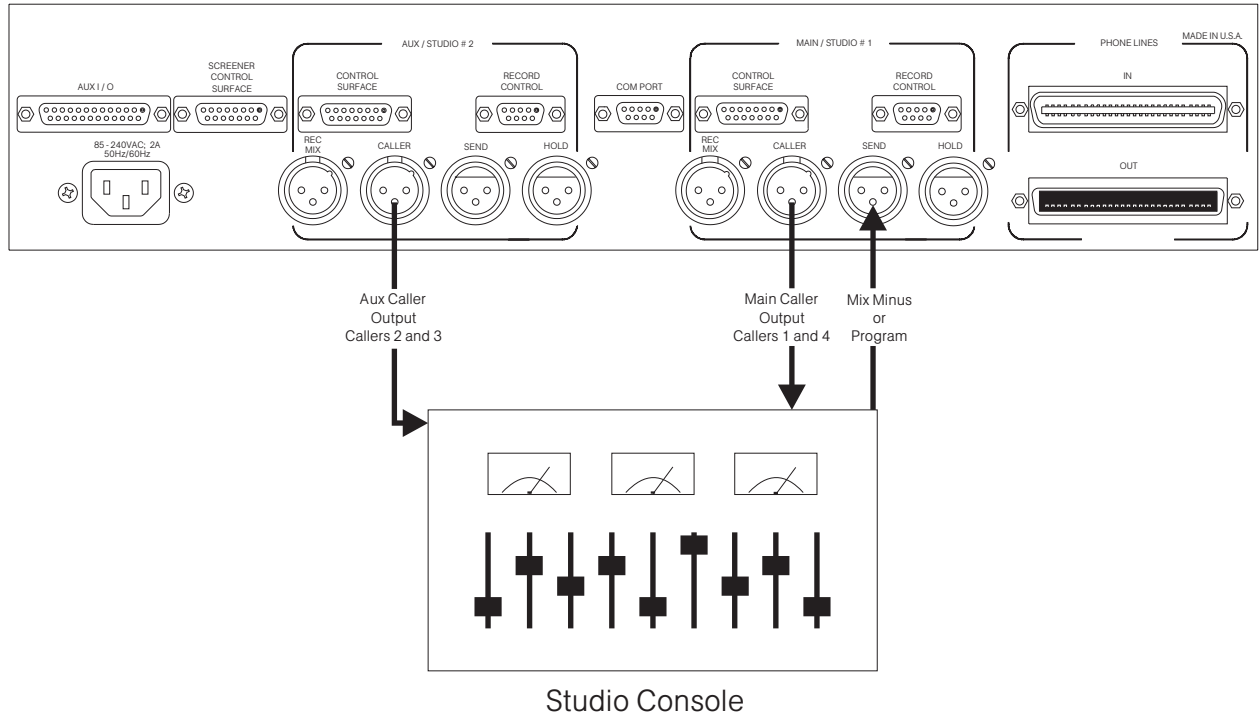
DIP Switch Settings. For split-caller mode, DIP switch 6 should be down. DIP switch 3 determines the mix-minus setup for the configuration. If DIP switch 3 is in the up position, the TS612's internal mix-minus feature is active. Full program audio (including the caller audio) may be routed to the Main Send input. Caller audio will be removed by the TS612 before transmitting the signal back to the caller.
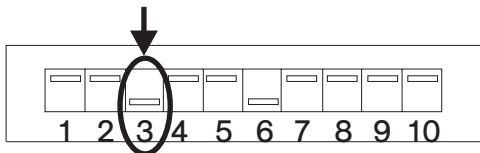
If DIP switch 3 is in the down position, external mix-minus must be provided. Caller audio from both Caller outputs (Main and Aux) must be removed from the program mix before routing the signal to the Main Send input.

Single-Studio Split-Hybrid

In split-hybrid mode, the two hybrids operate independently. Caller audio is routed to the audio console through both Caller outputs (Main and Aux) in the same manner as split-caller mode. The primary difference is that the hybrids receive program audio through two separate Send inputs (Main and Aux). As in split-caller mode, Hybrid 1 audio is routed to the Main Caller output and Hybrid 2 audio is routed to the Aux Caller output.

Studio Console
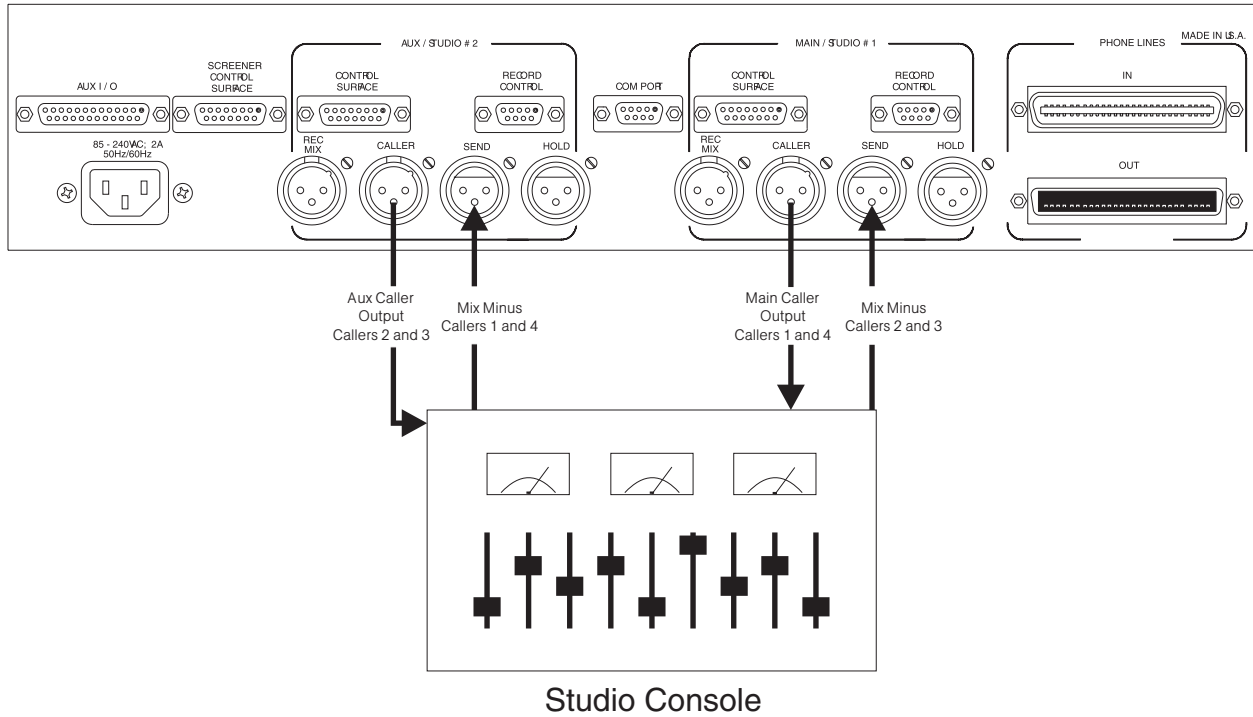
DIP Switch Settings. For split-hybrid mode, DIP switch 7 should be down. The recommended mix-minus setting for split hybrid mode is DIP switch 3 down. This setting requires external mix-minus. The audio mix routed to the Main Send input should not have callers two and three mixed in. Likewise, the Aux Send audio input should not have callers one and four mixed in. This allows the studio console operator to adjust the caller to caller level between the two TS612 hybrids.

For configurations requiring internal mix-minus, we recommend that you use Split-Caller Mode. You will only have to provide one program mix from the studio console to the TS612.
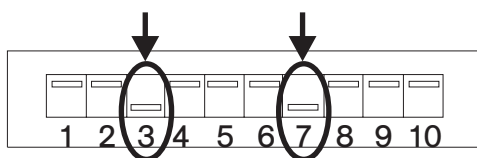
Dual-Studio

In this configuration, the TS612 operates as two single-hybrid telephone systems in either split or shared mode.

Split Mode. In split mode, the two talent control surfaces operate independently. Studio 1 controls lines 1–6 and studio 2 controls lines 7–12. The screener accesses all 12 lines to screen calls for either talent. All calls placed to air by studio 1 are routed to the audio console through the Main Caller output. All calls placed to air by studio 2 are routed to the audio console through the Aux Caller output. Because each of the TS612's two hybrids has two call slots, each studio can conference a maximum of two calls together.
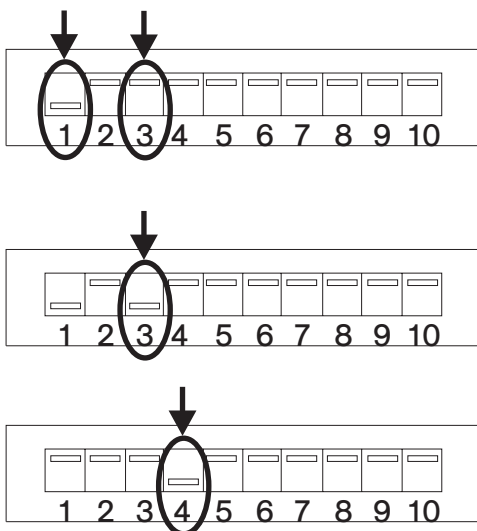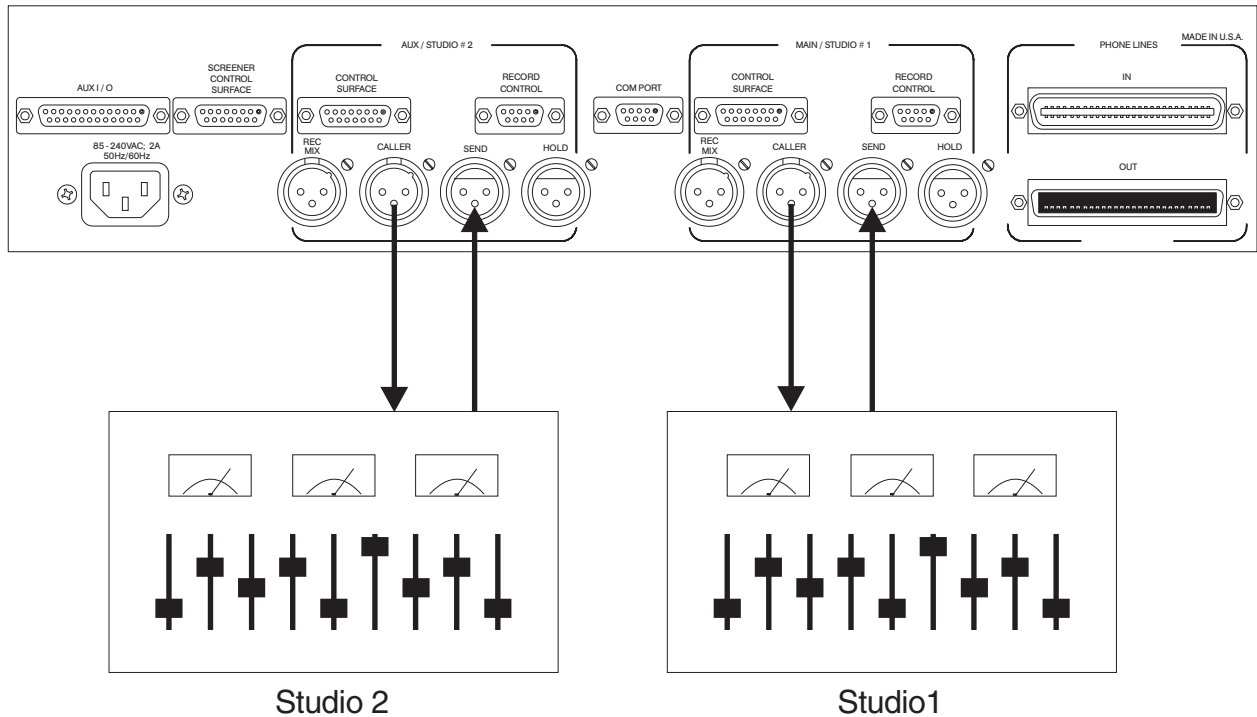
Studio 2

Studio1

DIP Switch Settings. For dual-studio mode, DIP switch 1 should be down. DIP switch 3 determines the mix-minus setup. If DIP switch 3 is up, the TS612's internal mix-minus feature is active. Studio 1 program audio (including the caller audio) may be routed to the Main Send input and Studio 2 program audio may be routed to the Aux Send input. Caller audio is removed by the TS612 before returning to the caller. If DIP switch 3 is down, external mix-minus must be provided. Caller audio must be removed from the program mix by each studio console before routing the signal to a Send input.

Shared Mode. In shared mode, both studios have control of all 12 lines and can see when a line is in use by the other studio.

If DIP switch 4 is down (shared mode), Studio 1 and Studio 2 have access to all 12 lines.

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Equipment Interconnections

Audio Hookup

The TS612 connects easily to a professional audio console using XLR connectors. The number of connections required is determined by the studio configuration you have established using the DIP switches. For more information on configuring the TS612, see page 13.

Send Balanced Audio Input. The TS612 has two send inputs: one for Main (Studio 1) input, and one for Aux (Studio 2) input. Send is a female XLR connector. Balanced program audio is routed from the console to the Send input for transmission to the telephone line. The nominal operating level sensitivity of this input is +0 dBu. Additional gain may be added to weak signals by adjusting the Send trim pots. For instructions, see the Calibration section beginning on page 26.

As shipped from the factory, the TS612 is set for operation with external (console) mix-minus. If your console does not supply a mix-minus, the TS612 will generate internal mix-minus when DIP switch 3 is placed in the up position. When internal mix-minus is selected, however, caller-to-send audio must not be increased more than 18 dB in the external loop. This external loop consists of the Caller and Send trim pots as well as any console trim pots. An increase of more than 18 dB in the external loop will produce echo or feedback.

Hold Balanced Audio Input. The TS612 has two hold inputs: one for Main (Studio 1) input, and one for Aux (Studio 2) input. Hold is a female XLR connector. Balanced program audio is routed from the console and predelay (if using a digital delay), to the Hold input for use by the hold circuitry of the TS612. This is the audio which callers hear when placed on hold. For single-studio operation, only the Main Hold input should be connected to the console. For dual-studio operation, both Hold inputs (Main and Aux) should be connected.

The nominal operating level sensitivity for the Hold input is +0 dBu. Additional gain may be added to weak signals by adjusting the Hold trim pots. For instructions, see the Calibration section beginning on page 26.

Studio Console

Caller Audio to
Console Input

Send Audio
Mono Program

Hold Audio
Mono Program
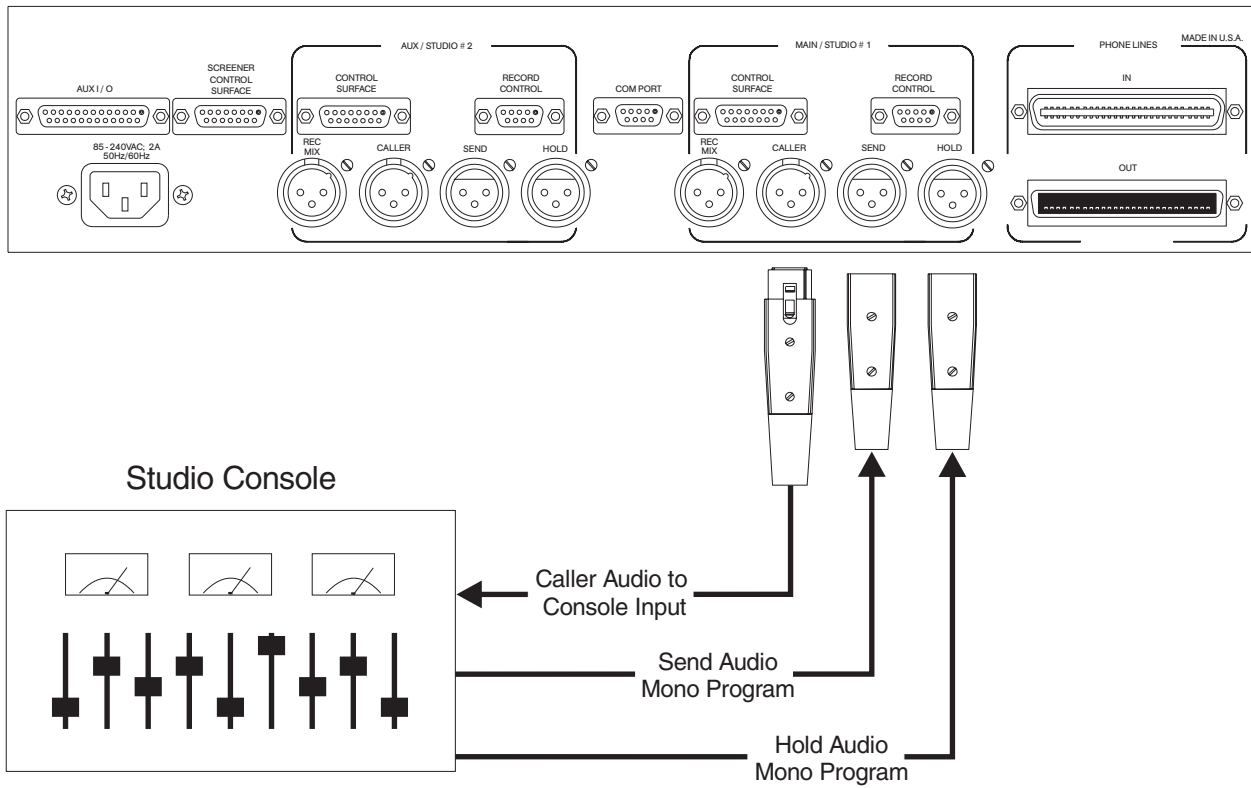
Caller Balanced Audio Output. The TS612 has two caller outputs: Main (Studio 1) and Aux (Studio 2). Caller is a male XLR connector. This output is used to connect audio from the digital hybrid (and from the telephone line) to an input on the console. When calls are conferenced, the Caller output contains a mix of these callers. The TS612 can conference up to four callers at a time in the conference mode. Both Caller output connections may be required depending on the TS612's configuration (see pages 13–18, Configuring the TS612).

The nominal operating level sensitivity for the Caller output is +0 dBu. Additional gain may be added to weak signals by adjusting the Caller trim pots. For instructions, see the Calibration section beginning on page 26.

Record Control Hookup

You can control external recording devices with start, stop, and enable standby signals provided by the TS612. For dual studio operation, two separate record controls and record mix outputs may be connected (one for each studio). In single studio modes, only one recording device needs to be connected.

Connect your recording device to the record-control connector located in the Main (Studio 1) section of the mainframe's back panel. The record-control connector provides open collector outputs capable of sinking 50 Vdc 40 mA. It is a DB9 female connector. For pinout mapping, see Appendix B (page 54). As shipped from the factory, the TS612 is set for momentary action of the control signals. If you wish to change the action of the control signals to latching, move DIP switch 2 to the down position.

DIP Switch 2 is a global parameter. Changing the setting from momentary to latching will affect all open collector outputs, including record control.

Rec Mix is a male XLR connector. This output is used to connect a balanced mix of caller and send audio to an input on an external recording device.

Record Mix
Output

Record Control
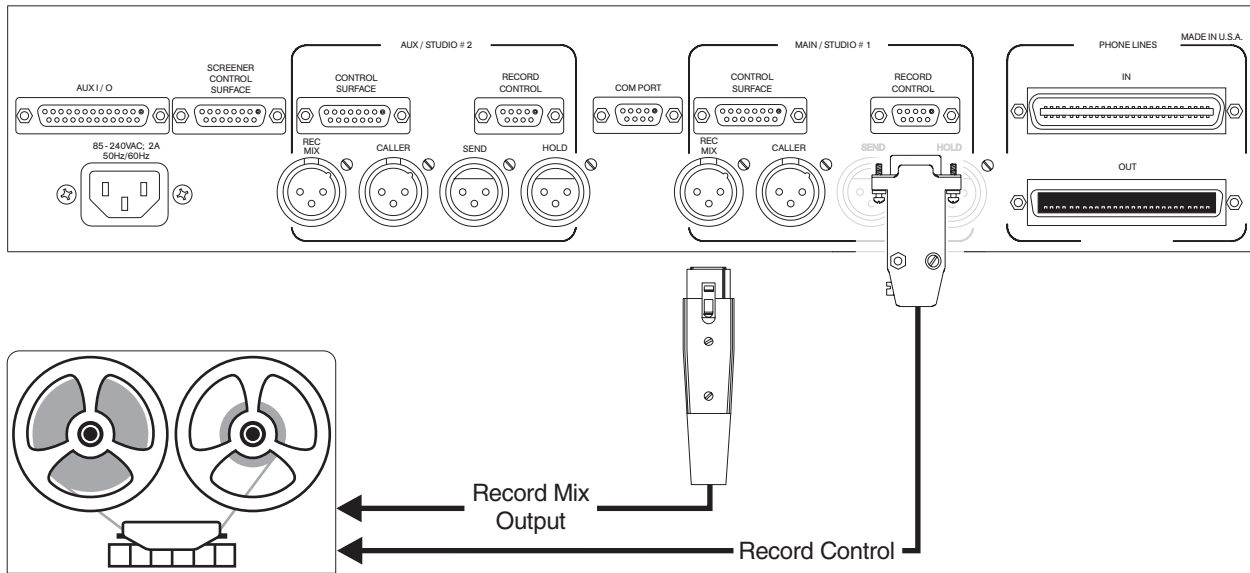
Aux I/O Hookup

The Aux I/O port is a DB25 female connector used to connect auxiliary devices to the TS612. These Aux inputs and outputs provide status information and control using the control surface Aux buttons. The six auxiliary inputs are opto-isolated and require a closure to ground for activation of the input. The eight auxiliary outputs are open-collector and will pull low when activated. Each output is capable of sinking 50 Vdc 40 mA.
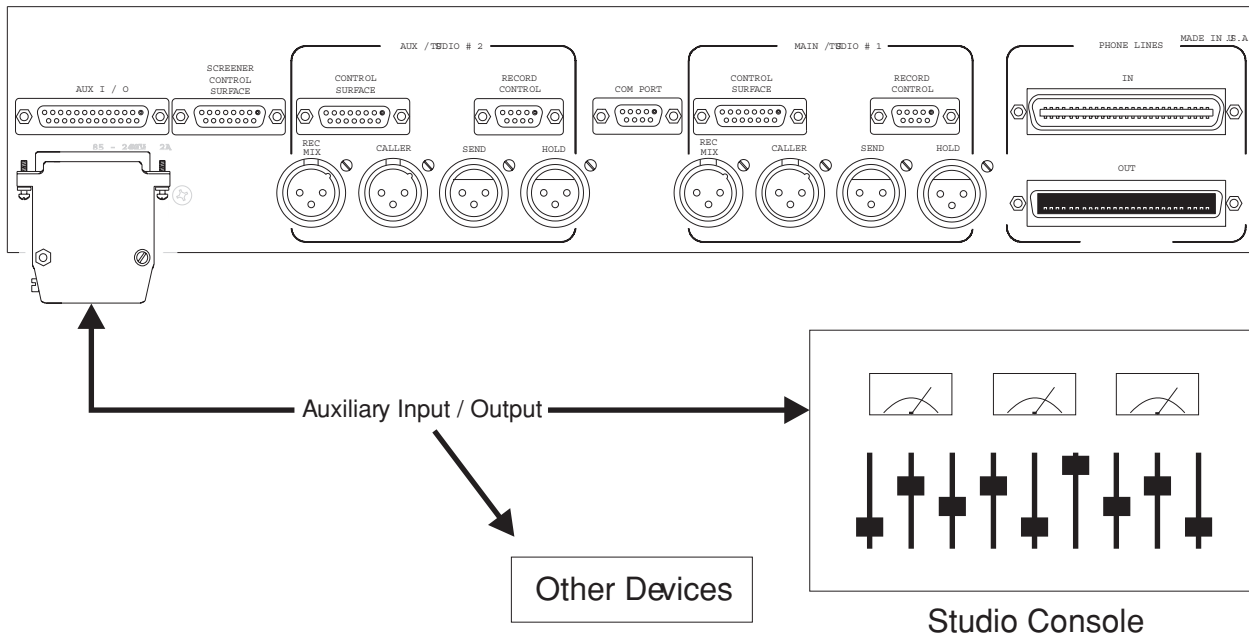
As shipped from the factory, the Aux inputs and outputs are set for momentary action. If you wish to change the action of the outputs to latching, move DIP switch 2 to the down position. To change the action of the inputs to latching mode, move DIP switch 9 to the down position. The tables on the following page indicate the functions associated with each input and output. For pinout mapping, see Appendix B (Page 56).
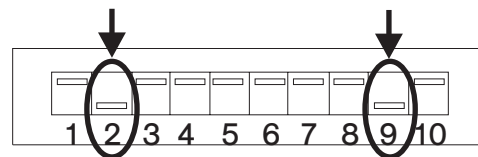
Aux Input Functions Table

Inputs	Momentary	Latching
Screener AUX LED*	Toggles with each closure	On when latched
Studio 1 AUX LED	Toggles with each closure	On when latched
Studio 2 AUX LED*	Toggles with each closure	On when latched
NEXT button input (defaults to Studio 1 in dual-studio mode)	• Places the next caller to handset or air with each closure. • If conference is pressed on control surface each closure will conference next call to air up to four	• Places the next caller to handset or air with each closure. • If conference is pressed on control surface. Each closure will conference next call to air up to four
NEXT Hybrid 1 button	• Places the next caller to air with each closure. • If conference mode is on then up to two calls can be placed to the hybrid. Remove calls from air with OFF button.	• Places the next caller to air with each closure. • If conference mode is on then up to two calls can be placed to the hybrid. Remove calls from air with OFF button.
NEXT Hybrid 2 button	• Places the next caller to air with each closure. • If conference mode is on then up to two calls can be placed to the hybrid. Remove calls from air with OFF button.	• Places the next caller to air with each closure. • If conference mode is on then up to two calls can be placed to the hybrid. Remove calls from air with OFF button.

*These inputs may be reassigned as Hybrid 1 Off and Hybrid 2 Off respectively. For detailed setup instructions see Setup mode, page 32.

Aux Output Functions Table

Outputs	Momentary	Latching
Screener AUX output	Pulses 500 mS when Aux button is pressed	Toggles output on and off with each press of the AUX button
Studio 1 AUX output	Pulses 500 mS when Aux button is pressed	Toggles output on and off with each press of the AUX button
Studio 2 AUX output	Pulses 500 mS when Aux button is pressed	Toggles output on and off with each press of the AUX button
Common Ring output	Activates when lines are ringing	Active when lines are ringing
Screened Hold indication	Activates when calls are in hold queue	Active when calls are in hold queue
Hybrid 1 Active	Pulses 500 mS when the hybrid turns on	Active while the hybrid is active
Hybrid 2 Active	Pulses 500 mS when the hybrid turns on	Active while the hybrid is active
Rec/Stop/Start/Enable	Pulses 500 mS when record mode is active	Latches when record mode is active

Control Surface Hookup

You may connect up to three control surfaces to the mainframe. Each Control Surface port on the back of the TS612 mainframe is a DB15 female connector. The port on the back of the control surface is a DB15 male connector. A 25-foot cable is included with each control surface. If the control surface cable is not long enough, a 25-foot extension cable is available from Gentner Communications Corporation (part number 830-003-025). For connector pinouts, see Appendix B page 54.

Each control surface has its own power supply. Do not plug the power supply into a wall outlet until you have finished installation of your system.

Both the Main (Studio 1) and Aux (Studio 2) control surfaces have complete control of on-air operations as well as independent access to off-air calls. The screener control surface has independent access to off-air calls and the ability to screen calls, but limited control of on-air operations. Control surface capabilities and setup will be discussed in detail in the chapter on Operation beginning page 31.
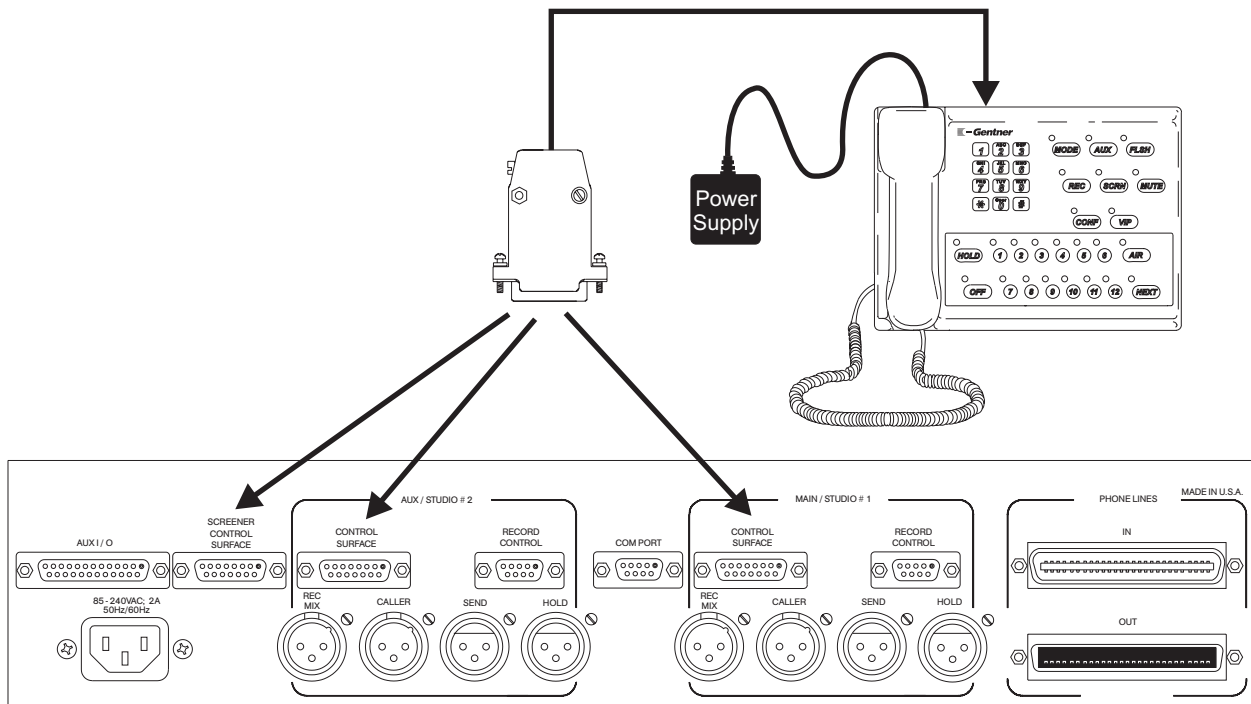
To prevent accidental disconnection of power to the control surface, install a cable clamp.

Secure the U-clamp to the bottom of the control surface. Replace the existing screw with the #4 X 3/8 PPH self-tapping screw (supplied with the U-clamp).

Control Surface
Back View

U-Clamp

Control Surface
Bottom View

U-Clamp
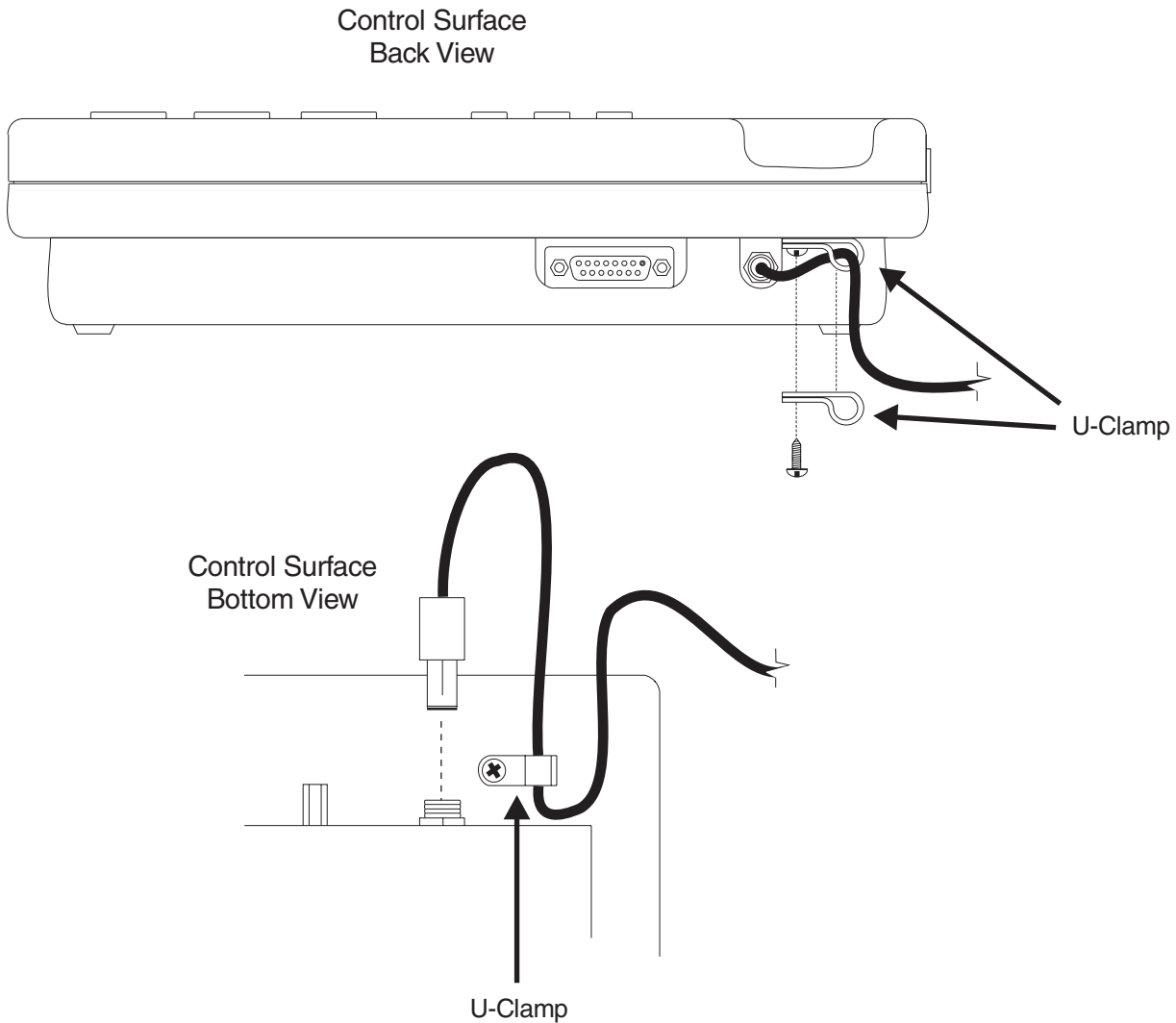
Calibration

Your TS612 has been calibrated at the factory to give optimum audio levels for most studios (+0 dBu). You can make adjustments to audio levels with the front-panel trim pots.

The trim pots for send audio, hold audio, caller audio, and automatic gain control of caller audio are behind the front access panel of the mainframe. Each trim pot is identified on the inside of the access panel.

CALLER   HOLD   SEND   AGC

= Gentner   **TS612**

CALLER   HOLD   SEND   AGC   HYBRID 1   HYBRID 2
                               SEND   CALLER   SEND   CALLER
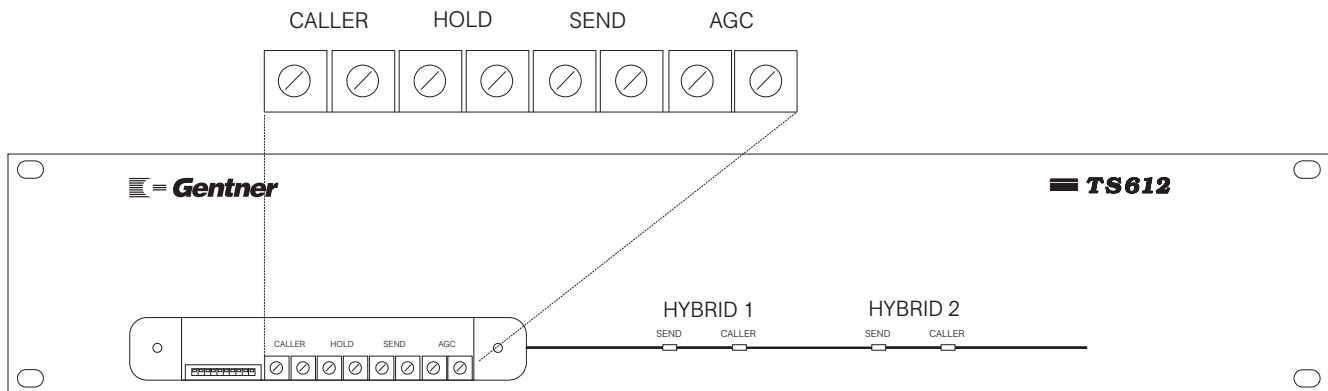
Calibration of Send Audio

To adjust the send audio, perform the following steps:

1. Using the talent control-surface handset in studio 1, dial an outside telephone number. Ask the answering party to create a quiet line by either disconnecting the handset cord or covering the mouthpiece of the telephone.

2. Press the Air button on the control surface to transfer the call from the handset to internal digital hybrid 1. The line indicator will glow red.

3. Set the program audio at normal operating level. If you have not already connected the program audio to the Send XLR connector in the Main (Studio 1) section of the back panel of the mainframe, make that connection now.

CALLER   HOLD   SEND   AGC

Hybrid 1 Hybrid 2

4. Locate the hybrid 1 Send trim pot behind the front access panel on the mainframe. While observing the hybrid 1 Send LED indicator on the front panel of the mainframe, turn the trim pot with a small flathead screwdriver until the indicator glows green most of the time, occasionally flashing red on peak volume. Red indicates a level of 6 dB before clipping.
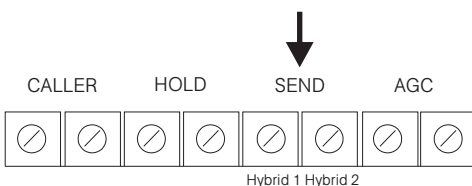
5. Using the talent control-surface handset in studio 2, repeat steps 1–3 above. Or if you're using split-hybrid operation, enable conference mode and send a second call to air using any control surface.

6. Locate the hybrid 2 Send level trim pot behind the front access panel on the mainframe, repeat steps 3–4 above.

7. Press the Off button on the control surface to disconnect the telephone line(s).

Step 5 through 7 apply to dual-studio and single-studio split-hybrid operations.

Calibration of Caller Audio
To adjust the caller audio, perform the following steps:

1. Using the talent control-surface handset in studio 1, dial an outside telephone number.

2. Press the Air button on the control surface to transfer the call from the handset to the internal digital hybrid 1. The line indicator will go red.

3. Set the Caller input on the studio console to its normal operating level.

4. Locate the hybrid 1 Caller trim pot behind the mainframe front access panel. With the called party speaking normally, turn the trim pot to match your audio equipment's input level. The Caller LED indicator on the front panel of the mainframe shows the strength of the caller signal coming off the telephone line; the caller-level trim pot has no effect on this indicator.

CALLER   HOLD   SEND   AGC
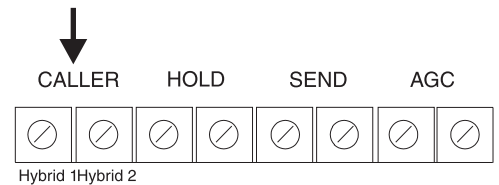
Hybrid 1Hybrid 2

5. Using the talent control-surface handset in studio 2, repeat steps 1–2 above. If you're using split-hybrid or split-caller operation, enable conference mode and send a second call to air using any control surface.

6. Locate the hybrid 2 caller trim pot behind the mainframe front access panel, repeat step 4.

7. Press the control surface Off button to disconnect the telephone line(s).

Step 5 through 7 apply to dual-studio, single-studio split-caller and split-hybrid operations.

Calibration of Hold Audio

To adjust the hold audio, perform the following steps:

1. Calibrate the send audio for studio 1.

2. Set the program audio at normal operating level. If you have not already connected the program audio to the Hold XLR connector in the Main/Studio 1 section of the mainframe back panel, make that connection now.

3. Using the talent control-surface handset in studio 1, dial an outside telephone number.

4. Press the Air button on the control surface to transfer the call from the handset to internal digital hybrid 1. The line indicator will glow red. The hybrid 1 Send indicator on the front panel of the mainframe will indicate the proper audio levels being sent down the telephone line.

5. Press the Hold button on the control surface to transfer the call to hold. The line indicator will change from glowing red to a slowly flashing green.

6. The hold audio level to the caller should be at the same level as the program audio when on-air. If the called party says there is a discrepancy between the two, locate the Hold 1 Send trim pot behind the mainframe front access panel. Alternately switch the line from air to hold (with the Air and Hold buttons), while turning the trim pot. Stop when the called party says the hold audio is at the same level as the send audio.

CALLER   HOLD   SEND   AGC
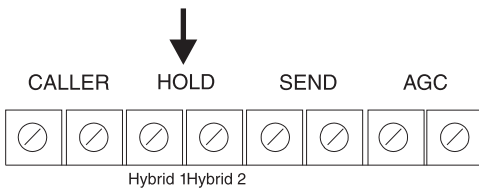
Hybrid 1Hybrid 2

Steps 7–10 apply to dual-studio operation only.

7. Calibrate the send audio for studio 2.

8. Using the talent control-surface handset in studio 2, dial an outside telephone number.

9. Repeat steps 4–6 (above) for digital hybrid 2 and the associated trim pot.

10. Press the control surface Off button to disconnect the telephone line.

Calibration of AGC

AGC (Automatic Gain Control) keeps the caller level from the TS612 to your audio equipment at a relatively consistent level regardless of the level received from the phone line. It's similar to having someone sitting at the caller trim pot and adjusting the pot up and down for each phone call. Each hybrid has a trim pot to adjust the speed of the AGC. The trim pot when turned fully counter clockwise will disable the AGC. With the trim pot turned fully clockwise the AGC will adjust the caller audio 6dB/100mS.

From the factory, the TS612's AGC is set aggressively. To adjust the amount of AGC, perform the following steps:

1 Using a talent control surface handset, dial an outside telephone number.

2. Press the Air button to transfer the call from the handset to air.

3. Locate the AGC trim pot behind the mainframe front access panel and turn it fully counterclockwise, disabling the AGC.

4. Place the caller on hold and then back to air. Monitor the caller level with no AGC. If this is acceptable then go to step 6. If you want more AGC then go to step 5.

5. While monitoring the caller audio, slowly turn the AGC trim pot clockwise until an acceptable amount of AGC is achieved.

6. Repeat steps 1–5 for hybrid 2. In Single Studio mode, enable conference mode and monitor the second caller's audio while making adjustments. In Dual Studio mode use Control Surface 2.

7. To optimize your AGC adjustment, spend time listening to the effect of AGC on various types of calls. (e.g. Long distance and local calls, calls from men and women).

CALLER   HOLD   SEND   AGC

Hybrid 1 Hybrid 2

TECHNICAL SUPPORT: 1.800.283.5936 (USA) OR 1.801.974.3760
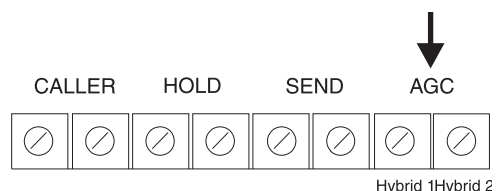
4 Setup and Operation

Operational Setup

Setup is an important part of operation because it allows you to determine how you want the TS612 to function. During setup you will be able to configure several operational modes which are discussed in detail on the following pages.

Networking Mode

The COM port located on the rear panel of the TS612 can be used to network multiple TS612 systems together. In network mode, the TS612 Network Interface (Gentner part number 910-003-320) passes line status information from one TS612 system to another, allowing several systems to share the same telephone lines and show proper hold, air, and in use status between systems. Network mode is selected by moving DIP switch 4 to the down position.
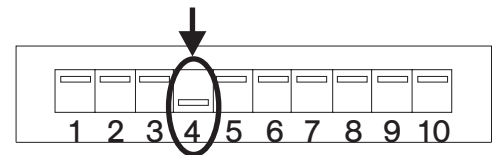
RS232 Standard Mode

In standard mode, the COM port operates as a parallel control of any control surface port. All commands received by the COM port will be treated exactly as if they came directly from the selected control surface. You may choose which control surface will be emulated by the COM port during control surface setup (page 34). For more information on serial communications protocol and serial codes, see Appendix C (page 57). RS232 standard mode is selected by moving DIP switch 4 to the up position.

Gentner.
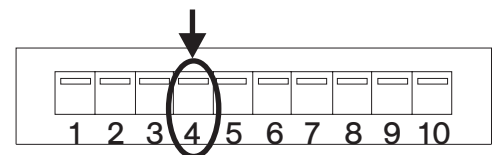
Loop-Override mode

The TS612 allows you to loop telephone lines through the system for use by telephone equipment downstream of the TS612 mainframe. When these lines are in use downstream, the TS612 is normally unable to access them. An in-use line appears amber on the control surface and the line cannot be picked up by pressing the button.
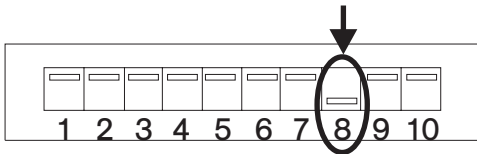
The TS612 can pick up lines which are already in use by downstream equipment when loop-override is activated. This feature should be used with caution. Once a downstream line is picked up it is no longer available to the downstream equipment until the 612 hangs up the line. Turn on loop-override mode by moving DIP switch 8 to the down position.

Setup Mode

This mode allows you to enable or disable the remaining operational modes of the TS612.
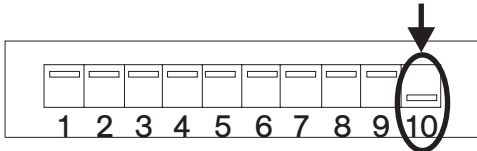
To enter setup mode, disconnect power to the TS612 mainframe and move DIP switch 10 to the down position. Then reconnect power to the TS612 mainframe.

Setup mode uses buttons on the Main (Studio 1) control surface to enable or disable specific operational modes. The position of DIP switch 10 at power up determines whether the control surface is ready for operation or setup. The control surface must also have power during setup mode.
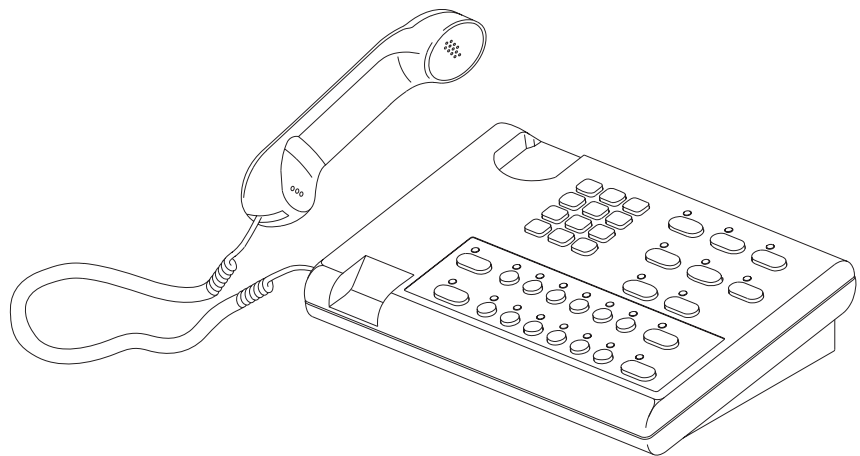
The table below shows the operational modes which can be selected during setup mode. Beginning on page 34, the operational modes are discussed in the order they appear on the table.

To select an operational mode, follow the steps below:

1. Select the register. To select a programming register, press the Mode button on the control surface followed by the numbers (001 or 002) on the touch-tone dial pad. You must enter all three numbers (0-0-1) in order to select the register.

> LED Color Coding. Upon power up, the Mode LED will be green. When Mode is pressed the LED will turn amber. When the touch-tone dial buttons are pressed, the assigned Line LED will briefly light up green to indicate that you have pressed the button. Line 10 = 0, Line 1 = 1, and Line 2 = 2. After the register has been selected the Mode LED will turn green again. A red Mode LED indicates an invalid register selection

Register	Line LED	Operational Mode	Buttons Used
001	1*	Main (Studio 1) Control Surface Emulation	N/A
001	2*	Aux (Studio 2) Control Surface Emulation	N/A
001	3*	Screener Control Surface Emulation	N/A
001	4*	Master Mode Emulation (All Control Surfaces)	N/A
001	5	Line / Hybrid Status	N/A
001	6	9600 Baud Screener Port	N/A
001	7	9600 Baud Aux/Studio Two Port	N/A
002	1	Two Button Hold Mode	HOLD + LINE
002	2	Screener Air Control	AIR or AIR + LINE
002	3	Previous Hold Mode	MODE & HOLD
002	4	Two Button Off Mode	OFF + LINE
002	5	Hook Flash Timing	FLSH

2. Select the operational mode. An operational mode is selected by pressing the corresponding Line button. You may select as many operational modes as you like, except where noted on the table. For example, if you have selected register 002, pressing Line buttons 1, 2, and 3 will activate Two Button Hold Mode, Screener Air Control, and Previous Hold mode.

> LED Color Coding. The corresponding line LED will light up red when selected and remain lit until the mode is deselected.

3. Exit the register. To accept your changes, press the Flash (FLSH) button. You may now select another register to continue setup (Steps 1 and 2), or return to operational mode.

> LED Color Coding. The Flash LED will light up red for a brief moment to indicate that the changes have been accepted to the register.
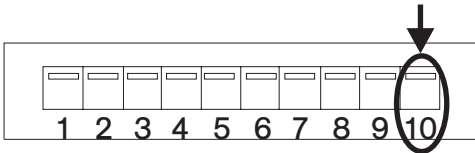
4. Return to Operational Mode. Once you have completed setup mode, disconnect power to the TS612 mainframe. Move DIP switch 10 to the up position, then reconnect power to the mainframe. All changes made during setup are now in effect.

Additional Operational Modes

The following modes are enabled during setup mode by pressing buttons on the control surface.

*Main (Studio 1) Control Surface Emulation. When this operational mode is selected, all commands received by the COM port are treated as if they were sent from the Main (Studio 1) control surface. For example, a line selected via a command to the COM port is routed to the handset of the Main (Studio 1) Control Surface. A call sent to air is routed to the Main (Studio 1) Caller connector. This mode is valid only when the mainframe COM port is set to RS232 standard mode (see page 31).

Only one of the emulation modes marked by an asterisk (*) may be selected during setup mode. More than one selection will prevent the COM port from sending any data.

*Aux (Studio 2) Control Surface Emulation. All commands received by the COM port are treated as if they were sent from the Aux (Studio 2) control surface. For example, a line selected via a command to the COM port is routed to the handset of the Aux (Studio 2) Control Surface and/or on-air connector. This mode is also valid only when used with RS232 standard mode.

*Screener Control Surface Emulation. All commands received by the COM port are treated as if they were sent from the screener control surface. A line selected is routed to the handset of the Screener Control Surface. Calls can be placed on hold, screened hold, or on-air (if Screener Air Control has been activated). This mode is valid only when used with RS232 standard mode.

*Master Mode Emulation (All Control Surfaces). This mode allows commands for all control surfaces to be received by the COM port. The TS612 treats commands just as if they were sent from the corresponding control surface. This mode is also valid only when used with RS232 standard mode.

Line/Hybrid Status. When this mode is selected, the COM port sends out data that indicates which line is active on which hybrid. This mode may be selected in conjunction with any of the above emulation modes and functions accordingly. This mode is also valid only when used with RS232 standard mode.

Screener Port 9600 Baud. When this mode is selected, the Screener port of the mainframe will operate at 9600 baud. Default is 1200 baud. A standard control surface will not operate at 9600 baud.

Aux/Studio 2 Port 9600 Baud. When this mode is selected, the Aux/Studio 2 port of the mainframe will operate at 9600 baud. Default is 1200 baud and a standard control surface will not operate at 9600 baud.

Two Button Hold Mode. This mode is for use when two or more calls are conferenced together. In normal operation, pressing Hold places all conferenced calls on hold at once. In Two Button Hold mode, you can place only one of the conferenced lines on hold by pressing Hold followed by a Line button.

> LED Color Coding. The Hold LED is solid red in this mode. Pressing the Hold button will cause the Hold LED to flash green. When a Line button is pressed, the Hold LED will return to red. If no Line button is pressed, the Hold LED will return to red after a brief delay.

Screener Air Control. This mode allows the screener control surface to place callers to air and to remove calls from the air to place them on hold. To place calls to air directly from the handset, press the Air button. If a screened call is on hold and you want to place it on air, press Air and then the line button. If a call is on-air and you want to place it on hold, press Air and then the line button. The status of the call determines whether the call is placed on air or put on hold.

LED Color Coding. When you have pressed the Air button, the Air LED will flash red until a Line button is pressed.

Previous Hold Mode. This mode allows you to switch from line to line quickly without disconnecting your callers. If you are on a call, pressing the Line button on another line will place the previous call on hold automatically. To disconnect a line while in Previous Hold mode, place the handset in the cradle or press the Off button. Normal hold mode requires you to press the Hold button to place a call on hold before you answer another line.

Once Previous Hold mode is activated in setup (page 32), you can switch back and forth between normal and Previous Hold modes using the control surface. The change is made by pressing and holding down the Mode button followed by a quick press of the Hold button.

LED Color Coding. The Hold LED is amber when Previous Hold mode is enabled. When Previous Hold mode is disabled, the Hold LED will turn off. If you are using Two Button Hold mode at the same time, the Hold LED will follow Previous Hold Color Coding, but still flash green while awaiting a line selection.

Two Button Off Mode. This mode allows you to disconnect any call by pressing the Off button followed by the Line button to be disconnected. This works for calls on the handset, on air, or on hold.

LED Color Coding. The Off LED is solid red when no calls are on air. The LED will turn off when calls are on air. In Two Button Off mode, pressing the Off button will cause the Off LED to flash red. When a Line button is pressed, the Off LED will return to solid red.

Hook Flash Timing. The hook flash function is used to signal PBX equipment or a central office switch. The timing length requirement for this hook flash varies between switch manufacturers. The default timing length is a 500 ms pulse. If you enable the Hook Flash Timing mode in setup (page 32), the timing length will be changed to a 55 ms pulse. Typically the 500 ms timing works with most switches in the U.S. and Canadian markets. The 55 ms timing works with most switches in the European and Latin American markets.

Hybrid 1 & 2 Off (Aux Inputs). When you enable this feature in setup mode (page 32), two of the Aux inputs are reassigned. The Screener Aux LED and Studio 2 Aux LED status inputs are reassigned as Hybrid 1 Off and Hybrid 2 Off inputs respectively. This provides you with parallel control to disconnect calls from the hybrids with a closure to ground.

Using the Control Surface

The control surface is your primary tool for day-to-day operations. Once the TS612 system is installed and configured, no further attention to the mainframe should be required. Up to three control surfaces may be connected directly to the mainframe: Main (Studio 1), Aux (Studio 2), and Screener. The studio control surfaces may be used as full dual controls in a single-studio setting, or as two separate control surfaces in a dual-studio setting. The screener control can be used to screen calls only, or can be used to screen calls and place them on the air (with limited capabilities).

When the handset is up, all actions affect the call on the handset. When the handset is down, all actions affect the call on the hybrids (on-air).

Studio Control Surface
When plugged into a studio port, the control surface is really two telephone systems in one: a regular multiline telephone and an on-air telephone.

> **1. Regular Multi-line Telephone.** When the handset is removed from the cradle, the TS612 routes a selected line to the handset.

> **2. On-Air Telephone.** When you leave the handset in the cradle and select a line, the TS612 routes the call to one of the internal digital hybrids for use on-air.

Because the TS612 system is two instruments, one call can be answered on the handset and a separate call can be on-air through the internal hybrids at the same time. In conference mode, up to four calls can be on-air simultaneously while you continue answering calls on the handset.

Screener Control Surface
When plugged into the screener port, the control surface has limited functions. In standard mode, only the handset function is active. A call cannot be placed on-air from a screener control surface, only on hold or screened hold. When Screener Air Control is active, the screener can also place screened calls on air, and put on-air calls to hold.

Control Surface Buttons

The operation of each of the control surface buttons is dependent upon which mainframe port the control surface is connected to. The buttons will be discussed first as they function when the control surface is plugged into a studio port. A discussion of button use with the screener port begins on page 43.
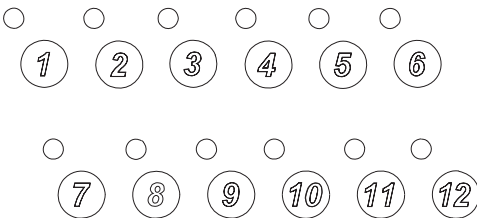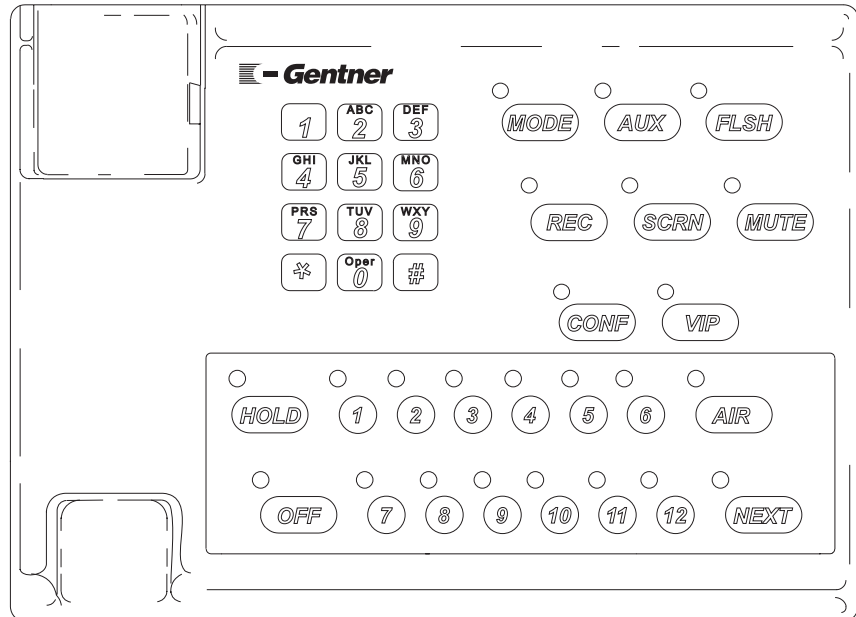
Telephone Line Buttons. The Line buttons are used for selecting telephone lines. Pushing a Line button will select that line. If the handset has been picked up before the line is selected, the call will be connected to the handset. If the handset is down when a Line button is pressed, the call will be placed on the air.

If you are on a call and press another Line button, the first line will be automatically disconnected. However, the TS612 also offers a new feature called Previous Hold Mode. When this mode is enabled in setup (page 32), you can switch lines without disconnecting the previous call. When a new line is selected, the previous line is put automatically on hold. For more information about this feature see page 36.

Line button operation does change, however, when the control surface is in conference mode. Push-on/push-off operation allows you to conference several lines together at one time, yet still disconnect individual callers from the conference. Press a connected Line button and only the caller on that line will be disconnected. The Off button will disconnect all of the conferenced callers.

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LED Color Coding. Each Line button has an LED line-status indicator located above it. These LED's have three colors to indicate call status: red, green, and amber. The status indications for Line LED are described below.

Not in use. When a line is not in use, the LED is off.

Ringing. A ringing line is indicated by a green LED that flashes on at a quick 4 Hz rate for one second, then off for one second, in a repeating cycle until answered.

In use on handset. When a call is connected to the handset, the Line LED will appear solid green.

In use on-air. A line that is in use on-air is indicated by an LED that is solid red.

In use elsewhere. When a call is in use by another control surface, or a networked TS612 mainframe, or downstream equipment, the Line LED will appear solid amber.

On hold. A line on hold is indicated by a green LED that is flashing at a slow 1 Hz rate.

On screened hold. A line on screened hold is indicated by a red LED that is flashing at a quick 2 Hz rate.

Color	Activity	Status
None	None	Not In Use
Green	Solid	In Use on Handset
Green	Flashing @ 4 Hz pulsed on & off @ 0.5 Hz	Ringing
Green	Flashing at a 1 Hz rate	On Hold
Red	Solid	In Use On-Air
Red	Flashing red at a 2 Hz rate	On Screened Hold
Amber	Solid	In Use Elsewhere

Line LED Quick Reference Table
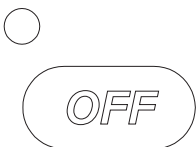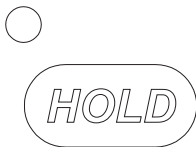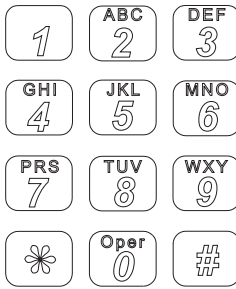
Touch-Tone Pad. The touch-tone pad is used for dialing out on the telephone system. Pressing any of these buttons will generate the appropriate touch tone. Remember that the touch tones generated are fixed pulse lengths. Pressing and holding a touch-tone number will not generate a continuous tone. Dialing can be done through the handset or on the hybrids (on air).

Hold Button. The Hold button places a call on hold. Pressing the Hold button while the handset is off the cradle will place the call on the handset on hold. Pressing the Hold button while the handset is in the cradle will place the call(s) that are on-air on hold.

The Hold button is also used in Two Button Hold mode. This mode is enabled during setup (page 32). Two Button Hold works in conference mode and allows you to place only one call on hold while leaving the others connected. Just press Hold and then the button for the line you want to place on hold. For more information on Two Button Hold, see page 35.

Off Button. The Off button disconnects on-air calls. The Off button normally has no effect on handset calls. To hang up a handset call, place the handset back in the cradle. The Off LED glows red when no lines are in use on-air. The LED is off when a line is in use on-air.

The Off button is also used in Two Button Off mode. This mode is enabled during setup (page 32). Two Button Off allows you to disconnect any call whether it is on the air, on hold, or on the handset. Just press Off and then the button of the line you want to disconnect. For more information on Two Button Off, see page 36.

AIR Button. The AIR button is used to instantly transfer a handset call to air. If there was a previous call on the air, it will be automatically disconnected. If you are in conference mode, the calls will be conferenced together on-air.

NEXT Button. The NEXT button is used for selecting calls which have been placed on hold. There are two different modes of operation for the NEXT button: NEXT non-screened and NEXT screened caller. When pressed in the non-screened mode, the NEXT button will select the line of the oldest holding call. In the screened mode, the NEXT button will select the line of the oldest holding screened call.

> LED Color Coding. The NEXT LED is off if there are no calls on hold. The LED will glow green if there are non-screened callers on hold. The LED will glow red if there are screened calls on hold.

MODE Button. The MODE button is used during Setup mode. For more information, see page 32. MODE is also used to toggle the previous hold mode, see page 36.

Aux Button. The Aux button is used to control external equipment such as a digital delay box. Pressing this button activates an output on the Aux I/O port. The Aux LED will light up red when a closure is applied to the appropriate Aux I/O input pin. For more information, see page 22.

FLSH Button. The FLSH button is used to hook-flash (temporarily disconnect) a line that is on the handset. This feature allows your TS612 to take advantage of line-handling features like transferring a call from the TS612 to an outside extension. Refer to your PBX single-line analog-extension features to determine line-handling features.

    LED Color Coding. The indicator above the FLSH button will light up when the FLSH button is pressed.

FLSH only works on the handset; it does not work for lines selected on-air.

REC Button. The REC button is used to control an external recording device. REC is active for on-air calls only. If pressed when a line is selected on-air, a start-recording signal will be sent to the external recorder; if pressed a second time, a stop signal will be sent to the external recorder.

If the REC button is pressed while no line is selected to air, the TS612 will go into a record-standby mode. In this mode, the start-recording signal will be automatically sent to the external recorder as soon as a line is selected to air. When the line is disconnected, a stop signal will be sent to the external recorder. The TS612 will remain in record mode until the REC button is pressed a second time.

    LED Color Coding. The LED above the REC button will glow red when recording and flash red when in record-standby mode. It will be off when the record mode is off.

SCRN Button. Pressing the SCRN button places the control surface in screening mode. This changes the NEXT button function from taking the oldest non-screened holding call to only taking screened calls from the screener surface.

    LED Color Coding. The SCRN LED is solid red when in screening mode, and is off when not in screening mode.

MODE

AUX

FLSH

REC

SCRN

MUTE Button. Pressing the MUTE button will mute the on-air caller audio. This button operates in a push-on/push-off mode. The caller will remain muted for as long as the MUTE button is on.

LED Color Coding. The MUTE LED is off when mute is off and solid red when mute is on.
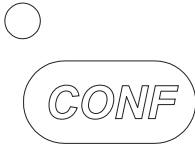
CONF Button. The CONF button places the TS612 into the conference mode. Conference mode applies only to on-air lines, it does not apply to lines on the handset. This changes the line-button operation to push-on/push-off, allowing lines to be conferenced together.

In single-studio mode, up to four lines can be conferenced together on-air. Once four lines have been selected for conference, no other lines can be selected until one of the four conferenced lines is deselected. In the dual-studio mode, only two lines may be conferenced together per studio.

In the conference mode, if the Off button is pressed, all active lines will be dropped. You may disconnect individual lines by pushing the line button, or by using the Two Button Off feature. The same is true for the Hold button; all active lines will be placed on hold, unless you are using the Two Button Hold feature.

LED Color Coding. The CONF LED is red when conference mode is enabled and off when it is disabled.

VIP Button. The VIP button places line 6 or line 12 into VIP mode. When in VIP mode, a call on line 6 or 12 (whichever line is selected first) is locked on. It cannot be accidentally dropped or placed on hold. This feature is used when you have a guest on line who you do not want to accidentally disconnect. VIP mode also places the TS612 into a special conference mode, which allows you to conference line-to-line, connecting a single caller to your VIP guest without needing to enable the conference mode.

LED Color Coding. The VIP LED is red when VIP mode is on, and off when VIP mode is not in use.

The CONF mode can be used in conjunction with the VIP mode to allow the conference of two additional callers with the VIP caller. In VIP mode and CONF mode, only three lines can be conferenced together. This provides the VIP with a dedicated hybrid for the best audio quality.

Screener Control Surface Buttons

The operation of each of the control surface buttons is dependent upon which mainframe port the control surface is connected to. This section describes the functions of the control surface when it is connected to the screener port.

The operation of the screener control surface is the same for many buttons, but there are some important differences. These differences will be discussed on the following pages.

Off Button. Pressing the Off button on the screener surface will disconnect a call. This eliminates the need to place the handset in the cradle to disconnect calls. The same is true when the screener is using a headset instead of the handset for screening calls.

Air Button. The screener does not normally have the ability to place a call on the air. However, when the Screener Air Control feature is enabled in setup (see page 32), the screener can place calls on the air and put on-air calls on hold. If a call is on the handset, the screener can immediately send them to air by pressing the Air button. If a previously screened call is holding, it can be placed on air by pressing Air and then the Line button. To put an on-air call on hold, press Air and then the Line button.

Next Button. The Next button is used for selecting calls which have been placed on hold. When pressed, the Next button will select the line of the oldest holding call. The indicator above the Next button is used to indicate callers in the hold queue. The indicator will be off if there are no calls on hold, glow green if there are callers on hold.

Screen Button. From the screener position, the Screen (SCRN) button is used to put a call on screened hold. When pressed, the active line will be placed into the screened hold queue. The Line LED will flash red. These calls are also made available to the studio control surfaces as screened-holding calls. The Screen LED is always green on a screener control surface.

Hold, Mode, Aux, Flash, Line Buttons, and Touch Tone Pad.
These buttons operate in the same manner as when the control surface is connected to a studio port.

Rec, Mute, Conf, and VIP. These buttons are non-functional on the screener control surface.

OFF

AIR

NEXT

SCRN

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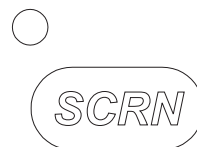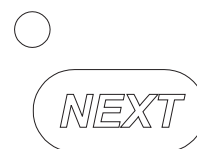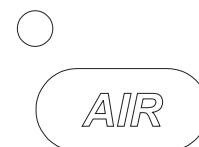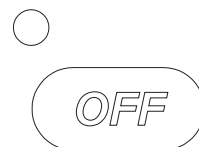
Call Handling

On the Handset

The following section reviews how calls are handled on the handset.

Answering a Call. Pick up the handset and press the line button of the ringing (green flashing) line. You may do this at any time, regardless of whether or not other calls are already on-air. Your handset will be connected off-air to the incoming caller. The LED for that line will glow solid green. Calls can be answered by going from line to line. Each time a new line is taken, the previous line will be disconnected, unless you are in Previous Hold mode (see page 36).

Making a Call. Pick up the handset and press the line button of any line not in use. You will hear a dial tone, and the line's LED will glow green, indicating that the call is on the handset. Dial the telephone number normally.

Hanging Up a Call. To disconnect the line on the handset, replace the handset in the cradle. The LED for the line will go out.

Placing a Call On Hold. While the call is on the handset (out of the cradle) press the Hold button. The caller will connect to hold audio. The line LED will slowly flash green, and the NEXT status indicator will glow solid green, indicating at least one call is on hold.

Taking a Call Off Hold. To take a call off hold and talk on the handset, press any green, slowly flashing line button with the handset off-hook. Your handset will be connected to the line off-air, and the line's LED will glow green, indicating that the call is on the handset. You can also press the NEXT button. This will take the oldest call on hold and connect it to your handset off-air. The Line LED of the oldest call on hold will change from a slow green flash to a steady, green glow, indicating that the call is now on the handset.

Transferring a Call from the Handset to Air. You must be at a studio control surface to place an on-air call. (A screener control surface cannot place an on-air call, unless you have enabled the Screener Air Control feature.) With the call on the handset, press the AIR button. This immediately transfers the call from the handset to the hybrid for on-air use. The Line LED will change from a green glow to a red glow, indicating that the call is on-air.

On-Air

The following section reviews how calls are handled on the air.

Answering a Call On-Air. You must be at a studio control surface to answer a call on the air. (A screener control surface cannot answer calls on-air.) With the handset down, press the line button of the ringing (green rapidly flashing) line. The line will be routed to a hybrid for on-air use (the LED for that line will glow red) allowing you to communicate with the caller through the audio console. Calls can be answered by going from line to line. Each time a new line is taken, the previous line is disconnected, unless you are in Previous Hold mode (see page 36).

Making a Call On-Air. Although dialing on air is not recommended due to changes in send to caller separation and the possibility for feed-back, it may be performed as follows. With the handset down, press the line button of any line that is not in use. You will hear a dial tone through your console and the line's LED indicator will glow red, indicating that the call is on-air. Dial the telephone number using the touch-tone key-pad.

The touch tones will be heard on-air unless you press the MUTE button first.

Hanging Up a Call. To hang up an on-air call, press the Off button. The LED for the line will go out. If conference mode is enabled (the red conference LED is lit), you may simply press the line button of the line you wish to hang up.

Putting an On-Air Call on Hold. With the handset down, press the Hold button. The caller will be connected to hold audio. The Line LED will slowly flash green, and the NEXT status indicator will glow green, indicating at least one call on hold. In conference mode, all calls will be placed to hold unless two button hold or VIP mode is selected.

Transferring a Call from Hold to Air. You can place a holding call directly to air by pressing the holding call's Line button with the handset down. The Line LED will glow red, indicating the call is on-air. You can also press the NEXT button. This will take the oldest call on hold and connect it to the hybrid for on-air use. The Line LED will change from a slow flashing green to a solid red glow, indicating that the call is now on-air.

Returning to a screened caller will affect the order in the queue. The caller that the screener returned to will be bumped to the end of the queue.

Taking Screened Calls. Calls may be screened from the screening control surface and placed into a screened hold queue. The studio control surfaces enter screening mode by pressing the SCRN button. The SCRN LED will glow red. This changes the operation of the NEXT button from taking the oldest call on hold to taking the oldest screened hold call. The NEXT button will take calls in the order they were screened. If there is at least one call in the screened hold queue, the NEXT status indicator will glow red. Screened calls may also be taken by simply

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pressing the associated line button. The advantage of using the NEXT button is that it ensures that only screened calls are taken to air and that they are taken in the order they were screened. Return the control surface to non-screened mode at any time by pressing the SCRN button again. The SCRN LED indicator will go off.

VIP for Guest Talents. The VIP mode protects one VIP (usually a show guest) from accidental disconnection. While in the VIP mode, the protected line cannot be placed on hold or disconnected. VIP mode works only for either line 6 or line 12.

Handling Multiple Callers in Conference Mode. Conference mode allows up to four callers to be on-air at the same time. The first two calls in the conference mode will have excellent quality. The third and fourth calls are button-mashed on top of the first two calls in each digital hybrid, slightly decreasing the performance of each hybrid. If VIP mode is activated, one digital hybrid is reserved for the VIP guest; in that case, up to two other callers can be button-mashed onto the other hybrid for a conference with the VIP guest. In the split-studio mode, with one hybrid dedicated to each studio, the second call is immediately button-mashed. Press the CONF button of a studio control surface to enable the conference mode. The LED above the CONF button glows red.

Conference mode changes the line button operation to push-on/push-off mode. Press the line button of another line to add it to the conference. Its status indicator will glow red. Keep connecting additional lines/disconnecting existing conferenced lines, as you wish. The maximum for a conference is a total of four lines, if not in VIP mode; if in VIP mode, the VIP line and two others are the maximum possible. To disconnect a single caller from the conference, press its associated line button to disconnect only that caller from the conference.

Recording a Call. A recording device must be connected to the REC MIX and Record Control connectors (see page 21) on the back panel in order for a recording to be made. To activate the recording device, press the REC button. If at least one line is active, the REC LED will glow red, indicating that the TS612 has started the recording device. If no line is active, the REC LED will flash red, indicating that the record mode is in standby, awaiting an active line before starting to record. When a line button is pressed, the record signal will be sent, and the REC LED will glow red. The record mode will change back to standby when there are no active on-air lines. To stop recording, press the REC button again. The REC LED will go off.

5

Glossary

AGC. Automatic Gain Control holds the TS612 output audio substantially constant despite input-signal amplitude fluctuations.

Balanced Audio. A two-line audio signal without reference to ground (i.e. differential-mode audio).

Console. The audio mixer used to combine all programming sources (i.e. announcer's voice, music, commercial announcements, etc.). A console is also called a mixing board, mixer, audio board, etc. In radio and TV, the console is located in a control room and is run by an announcer, operator or producer. In other applications, the console is the audio-mixing system used to combine audio sources for transmission. If using microphones, the audio console will typically be a microphone mixer. For assistance specifying a microphone mixer or console for your application, contact Gentner Communications Corporation.

Control Surface. The TS612 telephone used at the control locations. Broadcasters refer to these devices as control surfaces because of their system-control functions.

Digital Signal Processing. Digitally modifying a signal to provide a specific function or output. The TS612's digital signal processing enhances the separation of send to caller audio and performs automatic gain control and auto mix minus if selected.

DIP Switch. Dual in-line package of miniature rocker switches.

DSP. See Digital Signal Processing.

DTMF. Dual-tone multi-frequency (touch-tones by AT&T) for dialing on the phone system.

Handset. The hand held part of a communications system usually consisting of a phone, speaker and a microphone.

Hold. As with a business telephone, the TS612 hold feature takes calls off-air, or off the handset, and places them in a waiting mode. Special hold audio can be provided.

Hybrid. See Telephone Hybrid.

Keypad. The buttons on the control surface that control TS612 functions such as dialing, line selection and other function-related options.

Latching. A control signal that remains in a fixed state until you release it. This is opposed to a momentary control which is a pulsed signal.

LED. Light Emitting Diode. A semiconductor diode used in an electronic display that emits a light when subjected to an applied voltage.

Loop Through. Where the incoming signal is brought into the system and looped back out for use by other external equipment.

Loop Start. An analog type of telephone line in which the line is idle until loop current is drawn and the line is activated.

Mainframe. In this manual, Mainframe refers to the TS612 rack-mount central processing unit for this system.

Mix-Minus. Refers to the audio that must be sent to callers to prevent feedback on the audio system through the hybrid. Mix-minus is a mix of all audio on the console, minus the caller's audio. Without a mix-minus feed, the caller audio appearing on the console will be sent back to the caller. This feedback can create anything from echo to a howling squeal. Many broadcast consoles provide a mix-minus feed via a telephone module.

NEXT. A special feature of the TS612. As calls are answered and placed on hold, they go into a queue (sequence) enabling them to be taken in the order that they were answered or screened. The NEXT feature enables the operator to take calls in this order by pressing a button.

Off. Disconnects callers that are active on the system. It does not affect TS612 power.

On-Air. The operator is placing calls on the TS612 hybrids. In a broadcast application, callers are being put on-air with the announcer so the listening audience may hear the conversation.

Opto-Isolated. A control signal that is optically coupled. Usually used to prevent ground hum in an electrical system (optically isolated from the rest of the system).

PBX. Post Branch Exchange. See Telephone Line.

Pinouts. Configuration of signal-carrying lines on a connector.

POTS. See Telephone Line.

Screener. This refers to the person previewing calls before the announcer places them on-air. A typical screener will answer ringing lines and place them on hold, then will go back to each holding line and get specific information about each caller. A screener or producer typically decides whether to place a caller on-air after initial contact.

Superhybrid. The class of telephone hybrid used in the TS612. A Superhybrid uses DSP technology to automatically match the telephone line to your audio equipment; it also creates its own mix-minus feed (See Mix-Minus.) to callers. Superhybrids also provide AGC for improved clarity of the caller's audio.

Telephone Hybrid. A device which converts a telephone line (two-wire, low-level signal) into a balanced, four-wire, line-level signal with independent send/receive ports. A telephone hybrid provides necessary electronic matching between the telephone line and the audio equipment. Generally referred to in this manual as simply a hybrid.

Telephone Line. In this manual, a telephone line is defined as the line delivered by the telephone company to an individual subscriber. Sometimes known as a POTS (Plain Old Telephone Service) line, this is an analog line as required by fax machines or modems. The TS612 requires analog telephone lines for all phone-line connections.

You may use the TS612 in conjunction with a PBX (business telephone system). A PBX brings in a bank of telephone lines from the telephone company and provides a variety of functions with multi-line access.

Trim Pot. A potentiometer for adjusting (or trimming) signal levels.

VIP. Very Important Person. With the TS612, lines 6 and 12 are selectable VIP lines, preventing accidental disconnection from guest hosts and/or special interview guests.

XLR. A type of electrical connector.

6Appendices

Appendix A: Specifications

Control Surface Dimensions
11"/48.3cmW x 2.5"(3.75" w/ handset)/4.45cm(9.5cm w/ handset)H x 8.0"/30.5cmD

Mainframe Dimensions
19"/48.3cmW x 10-1/4"/26cmH x 3.5"/8.9cmD

TS612 System Weight
12.1 lbs./5.5 kg dry   19 lbs./8.6 kg shipping

Operating Temperature Range
32—100 F/0—38 C

Humidity Range
0—80 percent

Control Surface Electrical
12Vdc

Mainframe Electrical
85-240Vac 50/60Hz; 30W maximum

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Connectors

Power:	Auto-adjusting power module
RS232:	DB9 female serial port 9600 Baud, no parity, 8 data bits, 1 stop bit
Record Control:	DB9 female. Open collector outputs.
Auxiliary:	DB25 female
XLR:	3-pin audio connectors; pin 2 hot
PHONE LineS IN:	21X, 50-pin centronix male
PHONE LineS OUT:	21X, 50-pin centronix female
CONTROL SURFACE:	DB15

Telephone Specifications

Automatic Disconnect:	Disconnects on loop drop or loop reversal
Hybrid:	Transformer coupled with DSP adaptive cancellation
Key Service Compatibility:	Any key system providing true tip and ring compatibility to telephone instruments
Tip/Ring Switching:	Solid state relay

Telephone Transmit

All measurements are referenced to a +0dBm input and a -15dBm output level on the telephone line.

Frequency Response:	± 3dBu from 250 Hz to 3.3 KHz
THD: :	0.2 percent
SNR:	65dBu

Telephone Receive

All measurements are referenced to a -15dBm telephone input and a +0dBm output level.

Frequency Response:	± 1dBu from 250 Hz to 3.3 KHz
THD: :	0.2 percent
SNR:	63dBu

Audio Interface

MAIN SEND Input:	10k ohm active balanced, XLR bridging input +4dBm nominal with clipping threshold of +20dBm. This connector contains either Send mix-minus or program audio depending on mode. Level is adjustable via front access panel trim pot.
HOLD Input:	10k ohm active balanced, XLR bridging input +4dBm nominal with clipping threshold of +20dBm. This connector contains the audio you want the caller to hear when placed on hold. Level is adjustable via front access panel trim pot.
CALLERr Output:	50ohm nominal output impedance.Nominal output level +4dBm. Level is adjustable via front access panel trim pot.
RECORD-MIX Output:	50 ohm nominal output impedance; +4 dBm nominal. Output level set by Main Send input and Caller output.

Accessories (provided)

Power Transformer	25-foot interconnect cable
4 XLR connectors	Installation and Operations Manual
Rack screws	
Quick Reference Card	

Specifications are subject to change without notice.

Appendix B: Pinouts

Telco IN/OUT Pinout Table

Phone Line	Pin	Wire Color*	Pin	Wire Color*
1	1 TIP	blue/white	26 RING	white/blue
2	2 TIP	orange/white	27 RING	white/orange
3	3 TIP	green/white	28 RING	white/green
4	4 TIP	brown/white	29 RING	white/brown
5	5 TIP	silver/white	30 RING	white/silver
6	6 TIP	blue/red	31 RING	red/blue
7	7 TIP	orange/red	32 RING	red/orange
8	8 TIP	green/red	33 RING	red/green
9	9 TIP	brown/red	34 RING	red/brown
10	10 TIP	silver/red	35 RING	red/silver
11	11 TIP	blue/black	36 RING	black/blue
12	12 TIP	orange/black	37 RING	black/orange
*Wire colors are presented in the following format: base/stripe				

RS232 Com Port Pinout Table

Pin	Description
1	No Connection
2	Receive Data
3	Transmit Data
4	No Connection
5	Ground
6	No Connection
7	No Connection
8	No Connection
9	No Connection

Record Control Connector Pinout Table

Pin	Description
1	Start
2	No Connection
3	No Connection
4	Stop
5	Record Enable
6	Tape Start Com
7	No Connection
8	Tape Stop Com
9	Record Enable Com

Control Surface Cable Pinout Tables (both cable ends are shown)

Use twisted pair cable for the connections indicated below.

TS612 Mainframe (DB15M)

Pin	Description
1	Serial TX -
2	Serial TX +
3	Serial RX -
4	Serial RX +
5	Speaker +
6	Speaker -
7	Mic -
8	Mic +
9	Surface Reset
10	Ground
11-14	No Connection
15	Ground

TS612 Control Surface (DB15F)

Description	Pin
Serial TX -	1
Serial TX +	2
Serial RX -	3
Serial RX +	4
Speaker +	5
Speaker -	6
Mic -	7
Mic +	8
Surface Reset	9
Ground	10
No Connection	11-14
Ground	15

XLR Connector Pinout Table

Pin	Description
1	Ground
2	Positive Audio (+)
3	Negative Audio (-)

Aux I/O Connector Pinouts

Pin	Description	Pin	Description
1	Common	14	Screener Aux Lamp
2	Studio 1 Aux Lamp	15	Common
3	Studio 2 Aux Lamp	16	Next Button Input
4	Common	17	Next Hybrid 1 Input
5	Next Hybrid 2 Input	18	Common
6	Hybrid 1 Active Ouput	19	Hybrid 2 Active Output
7	Common	20	Output #3
8	Output #4	21	Common
9	Output #5	22	Screened Hold Indication Output
10	Common	23	Common Ring Output
11	Studio 2 Aux Out	24	Common
12	Studio 1 Aux Out	25	Screener Aux Out
13	Common		

Appendix C: Serial Communications Protocol

The COM port of the TS612 is an RS232 serial communications port used for control by external equipment such as a PC running screening software, or a digital storage device. This section defines the protocol used for communication and control of the TS612 system.

Currently, this port has been defined to have access to all status and commands used by the TS612 for communication with the control surfaces.

The interface to the mainframe through this port is an asynchronous, full-duplex RS232 serial interface. Connection is made through a DB nine-pin female connector. The pinout table can be found on page 54.

The specification table for the serial interface is shown below.

Serial Communication Protocol

Baud Rate	9,600 Baud
Start Bit	Low
8 Data Bits	Least Significant Bit First
No Parity Bit	N/A
Stop Bit	High

Reception begins when a start bit is detected on the receive line. The bit detector samples the value on the third, fourth, and fifth bits. The value accepted is the value that was seen in two of the three samples.

When issuing commands to the TS612 through the COM port, there is a 4 byte buffer. Bytes must be spaced 20–50ms apart.

Hex Codes

Communication between the control surface and the mainframe consists of hex codes which define button closures and lamp-status indications. The mainframe CPU maintains the status of the TS612 system. The control surface is a dumb terminal that is programmed to constantly scan and update the mainframe with a unique hex code which defines the condition of each button (released or pressed) on the control surface. The mainframe determines the proper action to take based upon the button hex codes received from each control surface. The table on the facing page shows the assigned hex codes.

Button Closure Hex Codes

Button Function	Released	Pressed	Button Function	Released	Pressed
Line 1	11	10	DTMF 1	05	04
Line 2	31	30	DTMF 2	25	24
Line 3	51	50	DTMF 3	45	44
Line 4	71	70	DTMF 4	0D	0C
Line 5	91	90	DTMF 5	2D	2C
Line 6	B1	B0	DTMF 6	4D	4C
Line 7	19	18	DTMF 7	65	64
Line 8	39	38	DTMF 8	85	84
Line 9	59	58	DTMF 9	A5	A4
Line 10	79	78	DTMF 0	8D	8C
Line 11	99	98	DTMF *	6D	6C
Line 12	B9	B8	DTMF #	AD	AC
OFF	01	00	AUX	A9	A8
HOLD	21	20	FLSH	69	68
NEXT	41	40	REC	09	08
AIR	A1	A0	SCRN	61	60
MODE	89	88	MUTE	29	28
CONF	49	48	VIP	81	80
Hook Switch on Hook		C1	Hook Switch Off Hook		C0
Control Surface Reset		F0	Control surface Query response		F1

Status byte sent from mainframe to the control surface.

000 00 000

COL address bits
ROW address bits
LED display mode bits
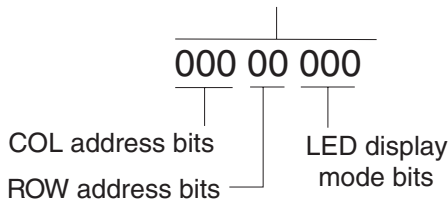
Status Bytes

Status for the system is displayed at each control surface. Each button, other than the DTMF buttons, has a status LED associated with it. These LED's are used to indicate the various states of operation. The mainframe maintains the status information and sends updates of this status to the control surface. A separate 8 bit encoded byte is sent to the control surface for each of the 24 LED's on the control surface. This byte is encoded to contain the address of the LED and the mode to be displayed by that address. The diagram to the right defines the encoding scheme used for the control surface status bytes:

The control surface has eight different LED modes embedded in the microprocessor program for the control surface. These modes are the same for all LED's on the control surface. The tables on the following pages define each button's LED status indications.

LINE 1 LED

Status	byte	LED	Indication	Status
000	10	000	Both red and green off	Line not active
000	10	001	Solid red on	Line is selected on air
000	10	010	Solid green on	Line is selected on handset
000	10	011	Solid red and green on (amber)	Line is in use elsewhere
000	10	100	Not used	Not used
000	10	101	Flashing red @ 2 Hz rate	Line is on screened hold
000	10	110	Flashing green @ 1Hz rate	Line is on hold
000	10	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	Line is ringing

LINE 2 LED

Status	byte	LED	Indication	Status
001	10	000	Both red and green off	Line not active
001	10	001	Solid red on	Line is selected on air
001	10	010	Solid green on	Line is selected on handset
001	10	011	Solid red and green on (amber)	Line is in use elsewhere
001	10	100	Not used	Not used
001	10	101	Flashing red @ 2 Hz rate	Line is on screened hold
001	10	110	Flashing green @ 1Hz rate	Line is on hold
001	10	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	Line is ringing

LINE 3 LED

Status	byte	LED	Indication	Status
010	10	000	Both red and green off	Line not active
010	10	001	Solid red on	Line is selected on air
010	10	010	Solid green on	Line is selected on handset
010	10	011	Solid red and green on (amber)	Line is in use elsewhere
010	10	100	Not used	Not used
010	10	101	Flashing red @ 2 Hz rate	Line is on screened hold
010	10	110	Flashing green @ 1Hz rate	Line is on hold
010	10	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	Line is ringing

LINE 4 LED

Status	byte	LED	Indication	Status
011	10	000	Both red and green off	Line not active
011	10	001	Solid red on	Line is selected on air
011	10	010	Solid green on	Line is selected on handset
011	10	011	Solid red and green on (amber)	Line is in use elsewhere
011	10	100	Not used	Not used
011	10	101	Flashing red @ 2 Hz rate	Line is on screened hold
011	10	110	Flashing green @ 1Hz rate	Line is on hold
011	10	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	Line is ringing

LINE 5 LED

Status	byte	LED	Indication	Status
100	10	000	Both red and green off	Line not active
100	10	001	Solid red on	Line is selected on air
100	10	010	Solid green on	Line is selected on handset
100	10	011	Solid red and green on (amber)	Line is in use elsewhere
100	10	100	Not used	Not used
100	10	101	Flashing red @ 2 Hz rate	Line is on screened hold
100	10	110	Flashing green @ 1Hz rate	Line is on hold
100	10	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	Line is ringing

LINE 6 LED

Status	byte	LED	Indication	Status
101	10	000	Both red and green off	Line not active
101	10	001	Solid red on	Line is selected on air
101	10	010	Solid green on	Line is selected on handset
101	10	011	Solid red and green on (amber)	Line is in use elsewhere
101	10	100	Not used	Not used
101	10	101	Flashing red @ 2 Hz rate	Line is on screened hold
101	10	110	Flashing green @ 1Hz rate	Line is on hold
101	10	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	Line is ringing

LINE 7 LED

Status	byte	LED	Indication	Status
000	11	000	Both red and green off	Line not active
000	11	001	Solid red on	Line is selected on air
000	11	010	Solid green on	Line is selected on handset
000	11	011	Solid red and green on (amber)	Line is in use elsewhere
000	11	100	Not used	Not used
000	11	101	Flashing red @ 2 Hz rate	Line is on screened hold
000	11	110	Flashing green @ 1Hz rate	Line is on hold
000	11	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	Line is ringing

LINE 8 LED

Status	byte	LED	Indication	Status
001	11	000	Both red and green off	Line not active
001	11	001	Solid red on	Line is selected on air
001	11	010	Solid green on	Line is selected on handset
001	11	011	Solid red and green on (amber)	Line is in use elsewhere
001	11	100	Not used	Not used
001	11	101	Flashing red @ 2 Hz rate	Line is on screened hold
001	11	110	Flashing green @ 1Hz rate	Line is on hold
001	11	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	Line is ringing

LINE 9 LED

Status	byte	LED	Indication	Status
010	11	000	Both red and green off	Line not active
010	11	001	Solid red on	Line is selected on air
010	11	010	Solid green on	Line is selected on handset
010	11	011	Solid red and green on (amber)	Line is in use elsewhere
010	11	100	Not used	Not used
010	11	101	Flashing red @ 2 Hz rate	Line is on screened hold
010	11	110	Flashing green @ 1Hz rate	Line is on hold
010	11	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	Line is ringing

LINE 10 LED

Status	byte	LED	Indication	Status
011	11	000	Both red and green off	Line not active
011	11	001	Solid red on	Line is selected on air
011	11	010	Solid green on	Line is selected on handset
011	11	011	Solid red and green on (amber)	Line is in use elsewhere
011	11	100	Not used	Not used
011	11	101	Flashing red @ 2 Hz rate	Line is on screened hold
011	11	110	Flashing green @ 1Hz rate	Line is on hold
011	11	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	Line is ringing

LINE 11 LED

Status	byte	LED	Indication	Status
100	11	000	Both red and green off	Line not active
100	11	001	Solid red on	Line is selected on air
100	11	010	Solid green on	Line is selected on handset
100	11	011	Solid red and green on (amber)	Line is in use elsewhere
100	11	100	Not used	Not used
100	11	101	Flashing red @ 2 Hz rate	Line is on screened hold
100	11	110	Flashing green @ 1Hz rate	Line is on hold
100	11	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	Line is ringing

LINE 12 LED

Status	byte	LED	Indication	Status
101	11	000	Both red and green off	Line not active
101	11	001	Solid red on	Line is selected on air
101	11	010	Solid green on	Line is selected on handset
101	11	011	Solid red and green on (amber)	Line is in use elsewhere
101	11	100	Not used	Not used
101	11	101	Flashing red @ 2 Hz rate	Line is on screened hold
101	11	110	Flashing green @ 1Hz rate	Line is on hold
101	11	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	Line is ringing

MODE LED

Status	byte	LED	Indication	Status
011	01	000	Both red and green off	Mode not active
011	01	001	Solid red on	Invalid register entry
011	01	010	Solid green on	Indicates register is selected
011	01	011	Solid red and green on (amber)	Awaiting register selection
011	01	100	Not used	Not used
011	01	101	Flashing red @ 2 Hz rate	N/A
011	01	110	Flashing green @ 1Hz rate	N/A
011	01	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	N/A

AUX LED

Status	byte	LED	Indication	Status
100	01	000	Both red and green off	No input to opto coupler
100	01	001	Solid red on	Closure at opto coupler input
100	01	010	Solid green on	N/A
100	01	011	Solid red and green on (amber)	N/A
100	01	100	Flashing red @ 1 Hz rate	N/A
100	01	101	Flashing red @ 2 Hz rate	N/A
100	01	110	Flashing green @ 1Hz rate	N/A
100	01	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	N/A

FLSH LED

Status	byte	LED	Indication	Status
101	01	000	Both red and green off	N/A
101	01	001	Solid red on	Programming register
101	01	010	Solid green on	Generating Hook Flash
101	01	011	Solid red and green on (amber)	N/A
101	01	100	Flashing red @ 1 Hz rate	Not used
101	01	101	Flashing red @ 2 Hz rate	N/A
101	01	110	Flashing green @ 1Hz rate	N/A
101	01	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	N/A

REC LED

Status	byte	LED	Indication	Status
010	01	000	Both red and green off	Record mode not active.
010	01	001	Solid red on	Recording
010	01	010	Solid green on	N/A
010	01	011	Solid red and green on (amber)	N/A
010	01	100	Flashing red @ 1 Hz rate	Not used
010	01	101	Flashing red @ 2 Hz rate	Record mode enabled
010	01	110	Flashing green @ 1Hz rate	N/A
010	01	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	N/A

SCRN LED

Status	byte	LED	Indication	Status
000	01	000	Both red and green off	Screening disabled (studio)
000	01	001	Solid red on	Screening active (studio)
000	01	010	Solid green on	Screener control surface (on)
000	01	011	Solid red and green on (amber)	Screening locked out (studio)
000	01	100	Flashing red @ 1 Hz rate	Not used
000	01	101	Flashing red @ 2 Hz rate	N/A
000	01	110	Flashing green @ 1Hz rate	N/A
000	01	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	N/A

MUTE LED

Status	byte	LED	Indication	Status
001	01	000	Both red and green off	MUTE diabled
001	01	001	Solid red on	MUTE enabled
001	01	010	Solid green on	N/A
001	01	011	Solid red and green on (amber)	N/A
001	01	100	Flashing red @ 1 Hz rate	Not used
001	01	101	Flashing red @ 2 Hz rate	N/A
001	01	110	Flashing green @ 1Hz rate	N/A
001	01	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	N/A

CONF LED

Status	byte	LED	Indication	Status
000	01	000	Both red and green off	Conference Mode disabled
000	01	001	Solid red on	Conference Mode enabled
000	01	010	Solid green on	N/A
000	01	011	Solid red and green on (amber)	N/A
000	01	100	Flashing red @ 1 Hz rate	Not used
000	01	101	Flashing red @ 2 Hz rate	N/A
000	01	110	Flashing green @ 1Hz rate	N/A
000	01	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	N/A

VIP LED

Status	byte	LED	Indication	Status
100	00	000	Both red and green off	VIP mode disabled
100	00	001	Solid red on	VIP mode enabled
100	00	010	Solid green on	N/A
100	00	011	Solid red and green on (amber)	N/A
100	00	100	Flashing red @ 1 Hz rate	Not used
100	00	101	Flashing red @ 2 Hz rate	N/A
100	00	110	Flashing green @ 1Hz rate	N/A
100	00	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	N/A

HOLD LED

Status	byte	LED	Indication	Status
001	00	000	Both red and green off	Previous Hold Mode disabled
001	00	001	Solid red on	2 Button Hold Mode enabled
001	00	010	Solid green on	Calls in the hold queue
001	00	011	Solid red and green on (amber)	Previous Hold Mode enabled
001	00	100	Flashing red @ 1 Hz rate	Not used
001	00	101	Flashing red @ 2 Hz rate	2 Button Hold Mode awaiting line selection
001	00	110	Flashing green @ 1Hz rate	Awaiting line selection
001	00	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	N/A

OFF LED

Status	byte	LED	Indication	Status
000	00	000	Both red and green off	Call on air
000	00	001	Solid red on	No calls on air
000	00	010	Solid green on	N/A
000	00	011	Solid red and green on (amber)	N/A
000	00	100	Flashing red @ 1 Hz rate	Not used
000	00	101	Flashing red @ 2 Hz rate	2Button Off Mode awaiting line selection
000	00	110	Flashing green @ 1Hz rate	N/A
000	00	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	N/A

AIR LED

Status	byte	LED	Indication	Status
101	00	000	Both red and green off	N/A
101	00	001	Solid red on	N/A
101	00	010	Solid green on	N/A
101	00	011	Solid red and green on (amber)	N/A
101	00	100	Flashing red @ 1 Hz rate	Not used
101	00	101	Flashing red @ 2 Hz rate	Screener Air Control awaiting line selection
101	00	110	Flashing green @ 1Hz rate	N/A
101	00	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	N/A

NEXT LED

Status	byte	LED	Indication	Status
010	00	000	Both red and green off	No calls in hold or screened hold queue.
010	00	001	Solid red on	Screening Mode active. Calls in Screen Hold queue.
010	00	010	Solid green on	Screen Mode not active. Calls in Hold queue.
010	00	011	Solid red and green on (amber)	N/A
010	00	100	Flashing red @ 1 Hz rate	Not used
010	00	101	Flashing red @ 2 Hz rate	N/A
010	00	110	Flashing green @ 1Hz rate	N/A
010	00	111	Flashing green @ 4Hz pulsed on and off at 1/2 Hz	N/A

Peek/Poke, Reset, and Other Commands

Peek and Poke are special commands to the TS612 mainframe which allow the user to examine and change memory one byte at a time. The entire RAM space from 0x2000 to 0x5260 and the EEPROM memory space from 0xB600 to 0xB7FF are valid for peek/poke commands. Be aware that the TS612 is oblivious to any changes made through the peek and poke commands.

Peek Command. The Peek command allows the user to "Peek" at, or examine memory space. The command format is as follows:

PC sends: 0xC9   Haddr Laddr
TS612 replies   0xC9   Haddr Laddr   data   checksum byte

Note that the TS612 echoes the command back to the PC before sending one byte of data and one byte checksum. Haddr is the high order address byte of the data, and Laddr is the low order address byte of the data.

Poke Command. The Poke command allows the user to change a byte value in memory. The command format is as follows:
PC sends: 0xCA   Haddr Laddr   data   checksum byte
TS612 replies: 0xCA   result
The result codes are:

    0x55   "Successful command"
    0xAA   "Bad checksum"
    0xFF   "The address is outside of RAM and EEPROM ranges"

EEPROM Layout. The EEPROM is laid out in the following fashion:

Address	Description
B600	EEPROM Software Revision High Byte
B601	EEPROM Software Revision Low Byte
B602	RS232 Port Emulation and Data Configuration (**001**)
B603	EEPGM1 Software Configuration Register 1 (**002**)
B604	B7FF — Reserved for Future Use

Register 001. RS232 Port Configuration

Bit	Description
0	COM port emulates Control Surface 1
1	COM port emulates Control Surface 2
2	COM port emulates Screener
3	COM port is in Master Mode
4	Hybrid Status transmitted over the COM port
5	9600 Baud Screener Port
6	9600 Baud Aux/Studio 2 Port
7	Not used

Only one of the COM port bits (0-3) may be enabled at the same time.

Register 002. Software Configuration.

Bit	Description
0	2-Button Hold is enabled when set
1	Screener Air Control is enabled when set
2	Previous Hold is enabled when set
3	Two-Button Off is enabled when set
4	Hook Flash Rate = 500 mS when clear, 55 mS when set
5	Control Surface 2 and Screener Auxiliary Outputs normal when clear, Hybrid 1 & Hybrid 2 Off when set
6-7	Not Used

Mainframe Reset. The reset command resets the mainframe by sending the following code:

0xCF

Master Mode. Master mode allows the PC to simulate commands from any control surface. Master mode is enabled during Setup (see page 32). The master mode protocol is as follows:

PC sends: cmd surface
TS612 replies: code surface

The valid cmd and code values are the assigned hex code values (see page 56). The valid surface values are **0** (control surface 1), **1** (control surface 2), and **2** (screener control surface).

Line/Hybrid Status. This mode allows the PC to retrieve status information for the emulated control surface (or all control surfaces if Master Mode is enabled). Line/Hybrid Status mode is enabled during Setup (see page 32). The Line/Hybrid Status protocol is as follows:

TS612 sends: C8 byte1 byte2 byte3 byte4 (surface)

The hex code C8 is used as a flag for the line/hybrid status. The following four bytes indicate which calls are active on the hybrids in the following order:

Byte1 = Hybrid 1 Slot 1   Byte2 = Hybrid 1 Slot 2
Byte3 = Hybrid 2 Slot 1   Byte4 = Hybrid 2 Slot 2

The following table lists the hex codes and their associated lines:
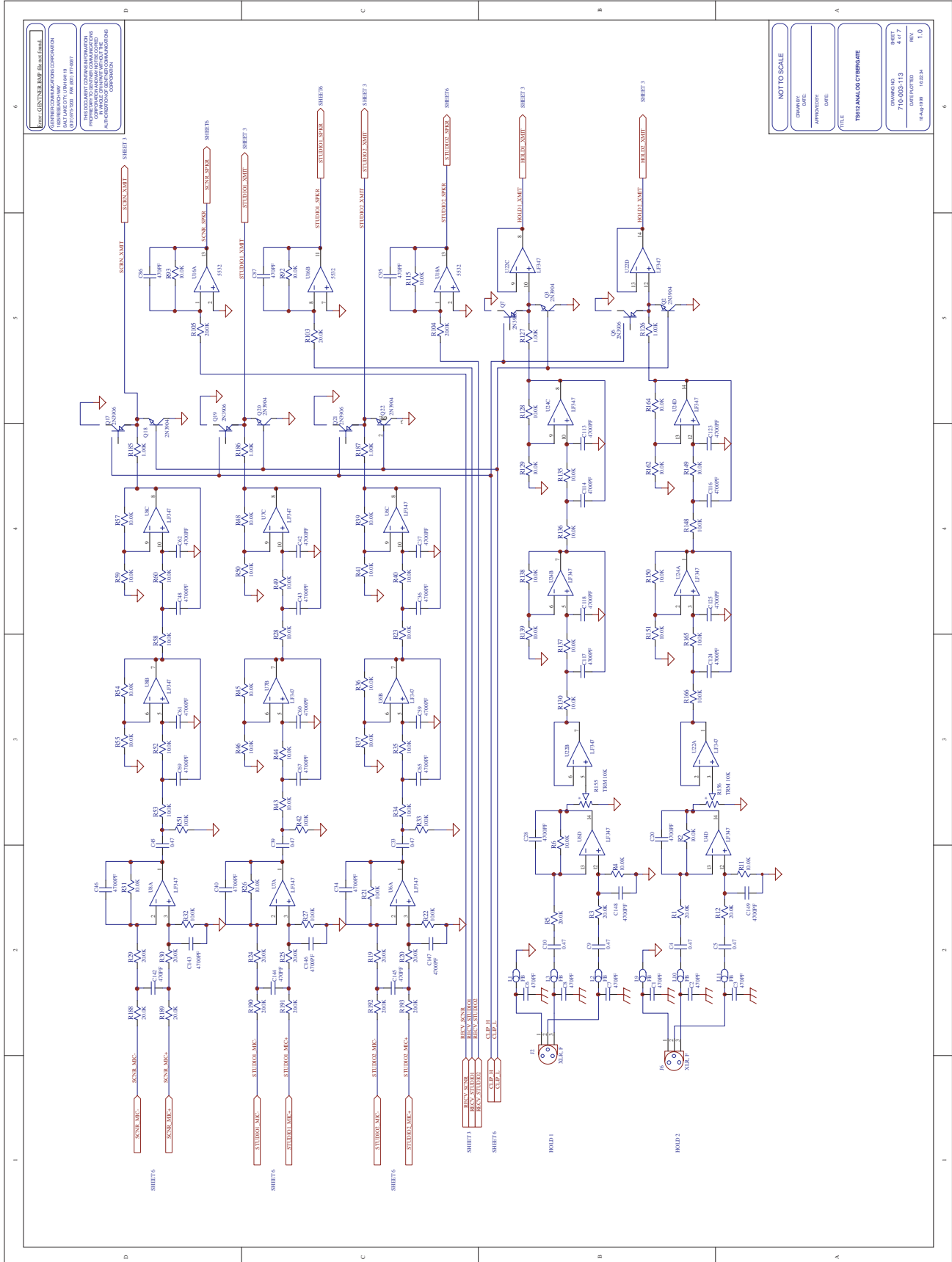
HEX CODE	00	01	02	03	04	05	06	07	08	09	0A	0B	FF
ACTIVE LINE	01	02	03	04	05	06	07	08	09	10	11	12	NONE

Example: **C8 00 01 02 FF** would indicate that line 1 is active on Hybrid 1 Slot 1, line 2 is active on Hybrid 1 Slot 2, line 3 is active on Hybrid 2 Slot 1, and no line is active on Hybrid 2 Slot 2.
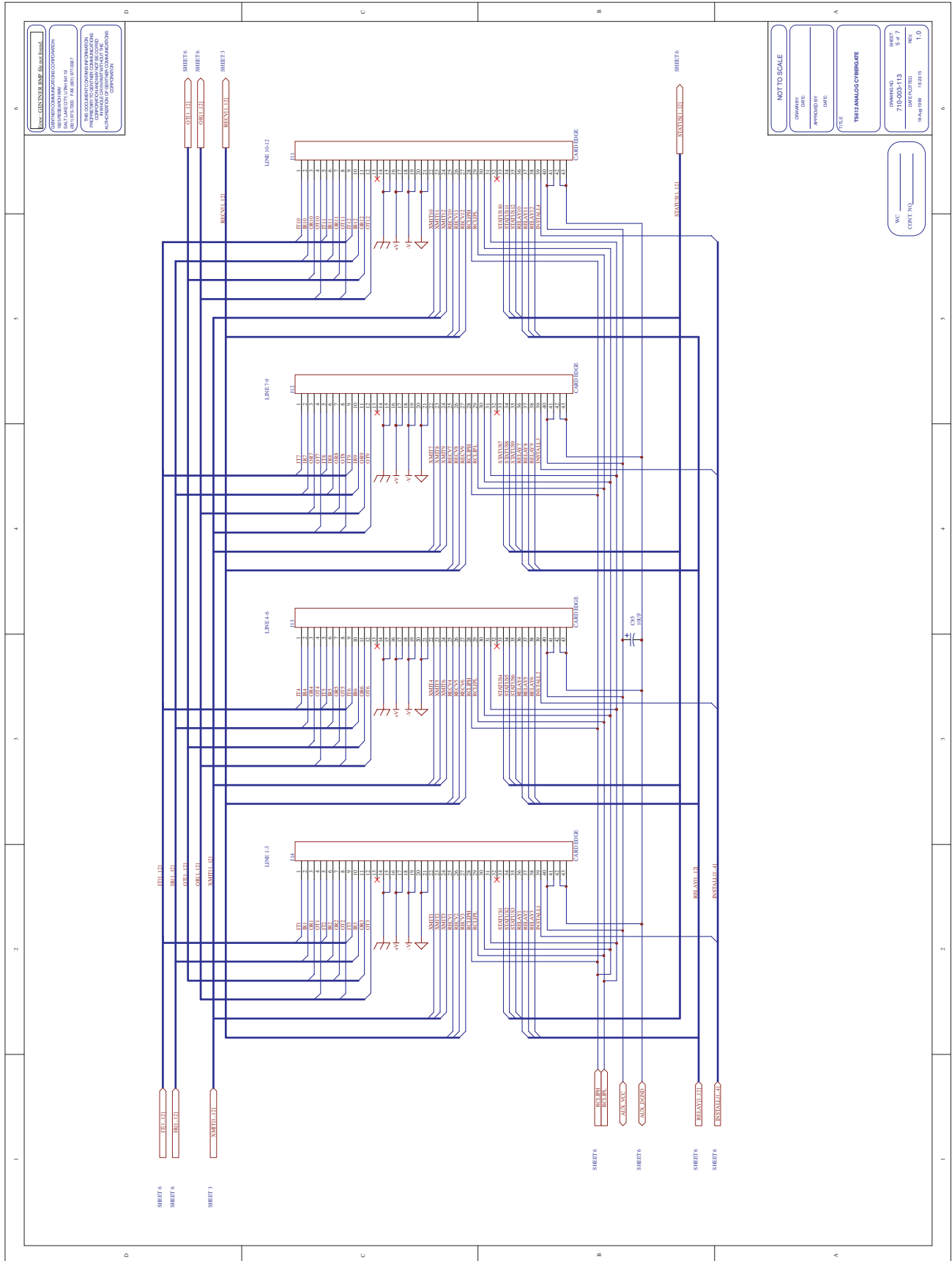
Appendix D: Schematics

TECHNICAL SUPPORT: 1.800.283.5936 (USA) OR 1.801.974.3760

GENTNER.

Appendix E:
Bill of Materials

The following bill of materials is accurate as of this printing. The information herein is subject to change without notice. If you want a more current bill of materials, please contact technical support as noted on the bottom of the page.

TS612 6-LINE UNIT 910-003-006

Item	Item Description(s)
400-241-614	BOX, TS612 SYSTEM SHIPPING, 24X16X14
400-241-617	INSERT, TS612 MAINFRAME DIVIDER, CORR
400-241-618	INSERT, TS612 CONSOLE DUMMY, CORR
400-300-009	INSERT, KORRVU SINGLE/DOUBLE RACK UNITS
400-300-011	INSERT, USE W/400-300-009 ACC. DIVIDER
401-000-070	BAG, 14" 4MIL CLR PLASTIC TUBING
401-000-060	BAG, 12" 4MIL CLR PLASTIC TUBING
432-000-015 (domestic)	LABEL, COMPLIANCE FCC PART 15
432-000-018	LABEL, BLANK 1.75 X 2.5, PRODUCT I.D.
432-000-019	LABEL, BLANK 3X3 1/4" w/peel away, PKG I.D
432-003-001	LABEL, ACCESS PANEL TS612
432-003-002 (domestic)	LABEL, CANADA COMPLIANCE
432-110-004	LABEL, CAUT ELECT SHOCK ADH
460-110-005	PWR SUPPLY, CP# NFS40-7608 +&-12/40W 5V
460-402-013	TWEAKER, TRIMPOT ADJUSTMENT?
585-600-001	FOAM, TAPE MISC 1"
664-500-003	CONN, XLR F 3P CABLE MNT
664-600-003	CONN, XLR M 3P CABLE MNT
671-000-009	HOOD, DB9
671-000-025	HOOD, DB25
671-220-009	CONN, DB9 M CABLE MT
671-220-025	CONN, DB25 M CABLE MT
681-010-204	SCREW, 4-40 X 1/4" PPH BLK ANOD SELF-TAP
681-010-506	SCREW, #6-32 X 3/8 PPH BLK W/INTTH WASH
681-010-604	SCREW, 6-32 X 1/4" PPH NYLON/LOCKING
681-210-606	SCREW, 6-32 X 3/8" PPH BLK
681-400-002	SCREW, 10-32 X 5/8" BLK POH, DECORATIVE
682-010-060	NUT, 6-32 X 1/4
683-046-403	SPACER, KIT M/F 4-40 X 3/16 W/HARDWARE
683-046-620	SPACER, M/F 6-32 X 1 1/4" HEX
684-050-060	WASHER, #6 INTERN TOOTH
684-400-001	WASHER, RACK CUP DECORATIVE
685-410-604	SCREW, 6-32 X 1/4" BUTTON HEX
699-150-006	PWR CORD, MOLDED 8' BLK 3 COND
699-360-001	MOD, PWR ENTRY RECEPT W/EMI FILT 3 AMPS

TS612 6-LINE UNIT 910-003-006

Item	Item Description(s)
740-003-101	CHASSIS, RU,TS612
740-003-102	PANEL, FRONT RU, TS612
740-009-003	COVER, DH
740-009-304	PANEL, ACCESS, DH
800-003-000	MANUAL, TS612
800-003-003	CARD, QUICK REF TS612 LAMINATED
820-003-113	PCB ASSY, AUDIO CARDEDGE (CYBERGATE)
820-003-114 (domestic)	PCB ASSY, DIGITAL (CYBERGATE)
820-003-115 (international)	PCB ASSY, DIGITAL INT'L (CYBERGATE)
820-003-106	PCB ASSY, GCU TS612 VER 1.5B
820-003-108 (domestic)	PCB ASSY, CYBERGATE TELCO CARDEDGE
820-003-109 (international)	PCB ASSY, CYBERGATE TELCO CARDEDGE INT'L
830-000-025	CABLE ASSY, 25 PAIR D50M/D50F 25FT
830-003-101	CABLE ASSY, MASC3P/MASC3P 18AWG 4"
830-003-103	CABLE ASSY, DB50M/IDC26PF RIBBON 6"
830-110-003	CABLE ASSY, MASC 6P/MASC 6P -9"
830-110-012	CABLE ASSY, CRIMP LUG/FASTON F -4" GRND
830-110-013	CABLE ASSY, FASTON F/MASC 3P -3"
910-003-200 (domestic)	TS612 CONTROL SURFACE UNIT (110)
910-003-220 (international)	TS612 CONTROL SURFACE UNIT (INT'L)

PCB ASSY, AUDIO CARDEDGE (CYBERGATE) 820-003-113

Item	Item Description(s)	Item Location(s)
432-500-010	LABEL, BLANK 1 X.5 WHT.	
500-005-817S	DIODE, 1N5817 SOD-87 PKG SMT	CR1, CR2
507-012-001	LED, RED/GRN RECTANGULAR 2X5 MM	DS1, DS2, DS3, DS4
511-011-150S	RES, 150 OHM 1/10 W 1% 0805 C SMT	R140, R141, R167, R168, R169, R170, R171, R172, R173, R174
511-011-604S	RES, 604 OHM 1/10 W 1% 0805 C SMT	R38, R47, R56, R72, R86, R87, R88, R89, R90, R94, R96, R100, R101, R102, R107, R110, R116, R117, R118, R119, R120, R121, R122, R123
511-012-100S	RES, 1.00 KOHM 1/10 W 1% 0805 C SMT	R125, R126, R127, R133, R146, R147, R185, R186, R187, R199
511-012-200S	RES, 2.00 KOHM 1/10 W 0805	R33, R42, R51, R82, R95, R106, R111
511-012-221S	RES, 2.21 KOHM 1/10 W 1% 0805 C SMT	R134, R145
511-012-499S	RES, 4.99 KOHM 1/10 W 1% 0805 C SMT	R75, R97, R142, R158, R175, R178
511-012-768S	RES, 7.68 KOHM 1/10 W 1% 0805 C SMT	R204, R207
511-013-100S	RES, 10.0 KOHM 1/10 W 1% 0805 C SMT	R2, R4, R6, R11, R13, R14, R16, R17, R18, R21, R22, R23, R26, R27, R28, R31, R32, R34, R35, R36, R37, R39, R40, R41, R43, R44, R45, R46, R48, R49, R50, R52, R53, R54, R55, R57, R58, R59, R60, R62, R63, R64, R65, R67, R76, R78, R79, R80, R81, R83, R84, R85, R91, R92, R93, R108, R109, R112, R113, R114, R115, R124, R128, R129, R130, R131, R132, R135, R136, R137, R138, R139, R144, R148, R149, R150, R151, R162, R164, R165, R166, R176, R179, R188, R189, R190, R191, R192, R193, R203, R205, R208, R211, R212, R213, R214, R215, R216, R217
511-013-150S	RES, 15.0 KOHM 1/10 W 1% 0805 C SMT	R74, R98, R206, R210
511-013-200S	RES, 20.0 KOHM 1/10 W 1% 0805 C SMT	R1, R3, R5, R7, R8, R9, R10, R12, R15, R19, R20, R24, R25, R29, R30, R61, R68, R69, R70, R71, R103, R104, R105
511-013-324S	RES, 32.4 KOHM 1/10 W 1% 0805 C SMT	R73, R99, R143, R157
522-400-103	RES, POT 10 KOHM 3/8" SQ TRIMMER	R153, R154, R155, R156, R159, R160, R161, R163
533-200-132S	IC, DIG 74HC132 QUAD SCHMITT NAND GT	U25
533-204-316S	IC, MIX HC4316 QUAD ANLG SWITCH	U9
535-300-815S	IC, ANA MT8815AP SWITCH ARRAY 44P PLCC	U10, U11, U12

PCB ASSY, AUDIO CARDEDGE (CYBERGATE) 820-003-113

Item	Item Description(s)	Item Location(s)
540-300-347S	IC, ANA LF347M QUAD BI-FET OP AMP SMT	U4, U6, U7, U8, U13, U14, U15, U17, U22, U24, U26
540-302-142	IC, ANA SSM2142 LINE DRIVER	U1, U2, U3, U5
540-405-532S	IC, ANA NE5532D DUAL OP-AMP LW NOISE SMT	U16, U18, U21, U23
543-007-805	IC, ANA REG AN7805CT 1 AMP +5V TO 220	U20
543-007-905	IC, ANA REG LM7905CT 1AMP -5V TO 220	U19
558-032-001S	FERRITE, CHIP BLM32AO7 40ohm 1206 C SMT	L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L15, L16, L17, L18, L19, L20, L21, L22, L23, L24.
561-103-904S	TRANS, 2N3904 SMT	Q1, Q2, Q3, Q4, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q18, Q20, Q22
561-103-906S	TRANS, 2N3906 PNP SMT	Q5, Q6, Q7, Q8, Q17, Q19, Q21
563-300-702S	TRANS, 2N7002 SMT	Q23, Q26
570-000-008	SOCKET, IC 8 PIN WIPER TIN	XU1, XU2, XU3, XU5
616-101-501S	CAP, 100PF 50V CERAMIC NPO 0805 SMT	C29, C30, C31, C32, C63, C76, C77 C122, C129
616-104-501S	CAP, 0.1UF 50V Z5U 0805 C SMT	C16, C17, C18, C19, C35, C38, C41, C44, C47, C49, C50, C51, C53, C54, C55, C56, C57, C58, C64, C66, C68, C70, C72, C73, C78, C84, C88, C89, C93, C96, C97, C98, C100, C104, C105, C106, C107, C108, C112, C115, C121, C128, C130, C131, C132, C133, C134, C154, C155, C156, C157
616-106-016S	CAP, 10UF 16V TAN 6032 C SMT	C26, C27, C85, C99, C101, C102, C103, C109, C110, C111, C126, C127, C160, C161
616-222-501S	CAP, 2200PF 50V NPO 1206 C SMT	C79, C80, C90, C94, C135, C137, C138, C159
616-471-100S	CAP, 470PF 100V NPO 0805 C SMT	C1, C2, C3, C6, C7, C8, C11, C12, C13, C21, C22, C23, C86, C87, C95, C140, C141, C142, C144, C145, C162, C163, C164, C165, C166, C167
616-472-100S	CAP, 4700PF 100V NPO 1206 C SMT	C20, C28, C34, C36, C37, C40, C42, C43, C46, C48, C59, C60, C61, C62, C65, C67, C69, C113, C114, C116, C117, C118, C123, C124, C125, C143, C146, C147, C148, C149

PCB ASSY, AUDIO CARDEDGE (CYBERGATE) 820-003-113

Item	Item Description(s)	Item Location(s)
616-474-501S	CAP, 0.47UF 50V Z5U 1812 C SMT	C4, C5, C9, C10, C14, C15, C24, C25, C33, C39, C45, C52, C71, C74, C75, C81, C82, C83, C91, C92, C119, C120, C136, C139, C150, C151
620-010-011	SWITCH, DIP RA 10 POLE 20 PIN BLK	SW1
664-260-003	CONN, XLR M 3P PC/ PNL BLK	J4, J5, J8, J9
664-360-003	CONN, XLR F 3P PNL MNT BLK	J2, J3, J6, J7
670-040-003S	CONN, 40 P M .21 H .05 X .05 SMT	J17, J18
671-720-050	CONN, DB50 F R/A PIN PC MNT	J1
673-012-003	CONN, HEADER POST 3P MASC .15C SPFL	J20
673-012-006	CONN, HEADER POST 6P MASC .15C SPFL	J19
673-020-040S	CONN, HEADER 2X20 X.1 F SMT	J15, J16
673-021-026S	CONN, HEADER STRIP 2X13=26P M, SHROUDED	J10
673-023-043	CONN, CARD EDGE 43P .156 SINGLE ROW	J11, J12, J13, J14
678-103-002S	TEST POINT, PC MOUNT SMT	TP1, TP2, TP3
720-003-113	PCB, AUDIO/CPU, TS612 (CARDEDGE)	

PCB ASSY, DIGITAL, TS612 (CYBERGATE) 800-003-114

Item	Item Description(s)	Item Location(s)
432-500-010	LABEL, BLANK 1 X.5 WHT.	
511-010-100S (international)	RES, 10 OHM 1/10 W 1% 0805	R57
511-011-301S (domestic)	RES, 301 OHM 1/10 W 1% 0805 C SMT	R61
511-015-100S	RES, 1.00 MOHM 1/10 W 1% 0805 C SMT	R22
512-011-150S	RES, 150 OHM 1/8 W 1206 C SMT	R1, R2, R3, R4, R5, R6, R7, R10, R20, R57
512-012-100S	RES, 1.00 KOHM 1/8 W 1% 1206 C SMT	R8, R9, R11, R12, R13, R14, R15, R16, R17, R18, R19, R21
512-013-100S	RES, 10.0 KOHM 1/8 W 1% 1206 C SMT	R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R58, R59, R60, R62, R63, R64, R65, R67, R68, R69, R70, R71, R72, R73, R74
533-200-541S	IC, DIG 74HC541 OCTAL TRISTATE BUFF	U23, U25
533-204-573S	IC, 74HC573D	U26
533-204-574S	IC, DIG 74HC574W CMOS FLIP FLOP SMT	U10, U11, U16, U17, U19
533-555-089	IC, MIX VRC TP5089 NATIONAL ONLY	U30
534-006-256S	IC, DIG 32KX8 STAT RAM 100NS 5.0V SOP	U28
534-068-111S	IC, DIG 68HC11A1 MICRO CONTROLLER	U20
534-075-179S	IC, DIG SN75179 B RS422 TRANS/REC	U1, U8, U14
534-082-684S	IC, DIG 82C684 CMOS QUAD CH UART RX/TX	U29
535-102-003S	IC, ANA ULN2003A TRANS ARRAY SMT,MC1413D	U9, U12, U15, U18, U31
535-201-111S	IC, ANA MCAH11L1 OPTO COUP	U2, U3, U4, U5, U6, U7
540-001-202S	IC, MIX RS232 MAX202 TRANSCEVR SMT	U13
540-001-232S	IC, DIG MAX1232CSA WATCHD TIMER 8PSO SMT	U22
558-032-001S	FERRITE, CHIP BLM32AO7 40ohm 1206 C SMT	L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L16, L17, L18, L19, L20, L21, L22, L23, L24, L25, L26, L27, L28, L29, L30, L31, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L42, L43, L44, L45, L46, L47, L48, L49, L50, L51, L52
570-450-028	SOCKET, IC 28 PIN .600 SPC MACH GLD	
583-180-358	CRYSTAL, 3.579545 MHZ HC-18U C	Y2
583-180-737	CRYSTAL, 7.3728 MHz HC-49/U C	Y1
616-104-501S	CAP, 0.1UF 50V Z5U 0805 C SMT	C1, C2, C3, C5, C6, C7, C8, C9, C10, C11, C12, C13, C16, C17, C18, C21, C23, C24, C26, C27, C28, C29, C31, C32, C33, C34, C35, C36, C37, C41

PCB ASSY, DIGITAL, TS612 (CYBERGATE) 800-003-114

Item	Item Description(s)	Item Location(s)
432-500-010	LABEL, BLANK 1 X.5 WHT.	
511-010-100S (international)	RES, 10 OHM 1/10 W 1% 0805	R57
511-011-301S (domestic)	RES, 301 OHM 1/10 W 1% 0805 C SMT	R61
511-015-100S	RES, 1.00 MOHM 1/10 W 1% 0805 C SMT	R22
512-011-150S	RES, 150 OHM 1/8 W 1206 C SMT	R1, R2, R3, R4, R5, R6, R7, R10, R20, R57
512-012-100S	RES, 1.00 KOHM 1/8 W 1% 1206 C SMT	R8, R9, R11, R12, R13, R14, R15, R16, R17, R18, R19, R21
512-013-100S	RES, 10.0 KOHM 1/8 W 1% 1206 C SMT	R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R35, R36, R37, R38, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51, R52, R53, R54, R55, R56, R58, R59, R60, R62, R63, R64, R65, R67, R68, R69, R70, R71, R72, R73, R74
533-200-541S	IC, DIG 74HC541 OCTAL TRISTATE BUFF	U23, U25
533-204-573S	IC, 74HC573D	U26
533-204-574S	IC, DIG 74HC574W CMOS FLIP FLOP SMT	U10, U11, U16, U17, U19
533-555-089	IC, MIX VRC TP5089 NATIONAL ONLY	U30
534-006-256S	IC, DIG 32KX8 STAT RAM 100NS 5.0V SOP	U28
534-068-111S	IC, DIG 68HC11A1 MICRO CONTROLLER	U20
534-075-179S	IC, DIG SN75179 B RS422 TRANS/REC	U1, U8, U14
534-082-684S	IC, DIG 82C684 CMOS QUAD CH UART RX/TX	U29
535-102-003S	IC, ANA ULN2003A TRANS ARRAY SMT,MC1413D	U9, U12, U15, U18, U31
535-201-111S	IC, ANA MCAH11L1 OPTO COUP	U2, U3, U4, U5, U6, U7
540-001-202S	IC, MIX RS232 MAX202 TRANSCEVR SMT	U13
540-001-232S	IC, DIG MAX1232CSA WATCHD TIMER 8PSO SMT	U22
558-032-001S	FERRITE, CHIP BLM32AO7 40ohm 1206 C SMT	L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14, L16, L17, L18, L19, L20, L21, L22, L23, L24, L25, L26, L27, L28, L29, L30, L31, L32, L33, L34, L35, L36, L37, L38, L39, L40, L41, L42, L43, L44, L45, L46, L47, L48, L49, L50, L51, L52
570-450-028	SOCKET, IC 28 PIN .600 SPC MACH GLD	
583-180-358	CRYSTAL, 3.579545 MHZ HC-18U C	Y2
583-180-737	CRYSTAL, 7.3728 MHz HC-49/U C	Y1
616-104-501S	CAP, 0.1UF 50V Z5U 0805 C SMT	C1, C2, C3, C5, C6, C7, C8, C9, C10, C11, C12, C13, C16, C17, C18, C21, C23, C24, C26, C27, C28, C29, C31, C32, C33, C34, C35, C36, C37, C41

PCB ASSY, GCU (60 MHZ) PROG. SING-SIDE (820-130-106)

Item	Item Description	Item Location(s)
432-500-010	LABEL, BLANK 1 X .5 WHT.	
503-030-318S	DIODE, SCHOTTKY 30V 200 NM SOT-23 SMT	CR1
511-000-022S	RES, 2.2 OHM 1/8 W 1% 1206 C SMT	R24
511-011-604S	RES, 604 OHM 1/10 W 1% 0805 C SMT	R20, R21
511-013-100S	RES, 10.0 KOHM 1/10 W 1% 0805 C SMT	R1, R2, R3, R5, R6, R7, R8, R9, R10, R11 R12, R13, R14, R15, R16, R17, R18, R19, R22, R23, R25
511-015-100S	RES, 1.00 MOHM 1/10 W 1% 0805 C SMT	R4
534-056-004S	IC, DIG 56002 DSP 40MHZ PQFP SMT	U3
534-056-006S	IC, DIG DSP56156 60MHZ CQFP SMT	U6
535-310-849S	IC, MIX CS4215 STEREO CODEC 16BIT SMT	U7
537-127-120S	IC, DIG 29F010 1MBIT FLASH PROM 150NS	U1, U4, U5
540-001-232S	IC, DIG MAX1232CSA WATCHD TIMER 8PSO SMT	U2
584-205-409S	CRYSTAL, 4.096MHZ SX2050P PKG SMT	Y1
616-102-101S	CAP, 1000PF 100V NPO 0805 C SMT	C25, C34, C36
616-104-501S	CAP, 0.1UF 50V Z5U 0805 C SMT	C4, C5, C6, C7, C8, C9, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C26, C28, C29, C33
616-105-016S	CAP, 1UF 16V TANT 3216 C SMT	C27, C32
616-106-016S	CAP, 10UF 16V TAN 6032 C SMT	C10, C35
616-220-100S	CAP, 22PF 100V NPO 1206 C SMT	C1, C2
616-472-100S	CAP, 4700PF 100V NPO 1206 C SMT	C3, C30, C31
670-040-002S	CONN, 40 P F .21 H .05 X .05 SMT	J1
678-700-080S	JUMPER, 0 OHM 0805 C SMT	JP1
720-130-013	PCB, GCU, SINGLE-SIDED	

UNIT ASSY, TS612 CONTROL SURFACE (850-003-200)

Item	Item Description
401-000-060	BAG, 12" 4MIL CLR PLASTIC TUBING
432-000-018	LABEL, BLANK 1.75 X 2.5, PRODUCT I.D
460-003-201	PAD, SWITCH COND RUBBER, TS612 CONS
585-100-005	BUMPER, RUBBER GREY 1/2"D 14 HIGH
681-010-312	SCREW, 4-40 X 3/4 PPH SELF TAP TYPE B
681-010-320	SCREW, 4-40 X 1 1/4 PPH SELF TAP TYPE B
681-810-500	SCREW, 4 X 1/4" PPH SHT MTL TAPPING
683-046-403	SPACER, KIT M/F 4-40 X 3/16 W/HARDWARE
684-040-040	WASHER, #4 FLAT& SPLIT LOCK
740-003-201	CHASSIS, UPPER CONSOLE, TS612
740-003-202	CHASSIS, LOWER CONSOLE, TS612
740-003-203	BRACKET, CONN CONSOLE, TS612
740-003-204	OVERLAY, KEYPAD MYLAR, CONSOLE TS612
740-003-205	OVERLAY, PAPER, SCREENER CONTROL TS612
740-003-206	OVERLAY, PAPER, STUDIO CONTROL TS612
820-003-201	PCB ASSY, CONTROL SURFACE, TS612
830-003-201	CABLE ASSY, RIB DB15M/IDC16PF 12"
830-003-202	CABLE ASSY, DCPWRF/MASC2P 22AWG 12"

PCB ASSY, CONTROL SURFACE, TS612 (820-003-201)

Item	Item Description	Item Location(s)
500-004-004	DIODE, 1N4004 1 AMP 400V	D11
507-010-022	LED, BI-COLOR FLAT	D1, D2, D3, D4, D5, D6, D7, D8, D13, D14, D15, D16, D17, D18, D19, D20, D21, D22, D23, D24, D25, D26, D27, D28
508-010-001	SENSOR, PHOTO	PS1
512-010-750S	RES, 75 OHMS 1/8 W 1% 1206 C SMT	R2, R15, R16, R17, R18, R19, R20, R21, R22, R28
512-011-150S	RES, 150 OHM 1/8 W 1206 C SMT	R6
512-011-750S	RES, 750 OHM 1/8 W 1% 1206 C SMT	R35
512-012-100S	RES, 1.00 KOHM 1/8 W 1% 1206 C SMT	R5, R7, R8
512-012-432S	RES, 4.32 KOHM 1/8 W 1 % 1206 C SMT	R36
512-013-100S	RES, 10.0 KOHM 1/8 W 1% 1206 C SMT	R9, R10, R11, R12, R13, R14, R23, R24, R25, R26, R29, R30, R31, R32, R33, R34
512-013-324S	RES, 32.4 KOHM 1/8 W 1% 1206 C SMT	R1
533-200-132S	IC, DIG 74HC132 QUAD SCHMITT NAND GT	U8
534-075-179S	IC, DIG SN75179 B RS422 TRANS/REC	U3
540-001-232S	IC, DIG MAX1232CSA WATCHD TIMER 8PSO SMT	U4
540-002-895S	IC, DIG UNC,5895EP 8BIT SER IIN SOURCE	U7
540-405-532S	IC, ANA NE5532D DUAL OP-AMP LW NOISE SMT	U6
543-000-086	IC, ANA REG LT1086CT 1.5A ADJ LW DRP OUT	Q10
543-007-805	IC, ANA REG AN7805CT 1 AMP +5V TO 220	Q3
558-032-001S	FERRITE, CHIP BLM32AO7 40ohm 1206 C SMT	L1, L2, L3, L4, L5, L6, L7, L8, L9, L10, L11, L12, L13, L14
563-300-702S	TRANS, 2N7002 SMT	Q1, Q2, Q4, Q5, Q6, Q7, Q9
571-500-028S	SOCKET, IC 28P PLCC SMT	XU2
583-180-110	CRYSTAL, 11.0592 MHZ HC18U C	Y1
586-010-320	SPEAKER, MINILERT MCP32OB2 PC MNT	B1
616-102-101S	CAP, 1000PF 100V NPO 0805 C SMT	C25
616-104-100S	CAP, 0.1UF 50V Z5U 1206 C SMT	C3, C6, C13, C14, C15, C16, C18, C20, C21, C26
616-106-016S	CAP, 10UF 16V TAN 6032 C SMT	C1, C2, C5, C19, C22
616-220-100S	CAP, 22PF 100V NPO 1206 C SMT	C9, C11
616-471-100S	CAP, 470PF 100V NPO 0805 C SMT	C27
616-471-501S	CAP, 470PF 50V NPO 1206 C SMT	C24
616-474-501S	CAP, 0.47UF 50V Z5U 1812 C SMT	C12
673-002-002	CONN, HEADER POST 2P MASC .10 C	J3
676-150-004	CONN, TELE 4P R/A LOW PRO LINE JACK	J2
678-224-016	PIN, STRIP DUAL 2X8=16PIN .24 TALL	J2
678-700-080S	JUMPER, 0 OHM 0805 C SMT	R37
681-810-500	SCREW, 4 X 1/4" PPH SHT MTL TAPPING	Q3, Q10
720-003-201	PCB, KEYBOARD, TS612	
807-003-201	FIRMWARE, U2, TS612 CONSOLE	U2

PCB ASSY, CYBERGATE TELCO CARDEDGE (820-003-108)

Item	Item Description(s)	Item Location(s)
511-011-150S	RES, 150 OHM 1/10 W 1% 0805 C SMT	R19, R36, R48
511-011-301S	RES, 301 OHM 1/10 W 1% 0805 C SMT	R14, R31, R47, R49, R50, R51
511-012-249S	RES, 2.49 KOHM 1/10 W 1% 0805 C SMT	R13, R30, R44
511-012-499S	RES, 4.99 KOHM 1/10 W 1% 0805 C SMT	R3, R9, R20, R25, R35, R40
511-012-562S	RES, 5.62 KOHM 1/10 W 1% 0805 C SMT	R11, R27, R42
511-012-604S	RES, 6.04 KOHM 1/10 W 1% 0805 C SMT	[R4, R23, R38 domestic] [R10, R26, R45 international]
511-013-100S	RES, 10.0 KOHM 1/10 W 1% 0805 C SMT	R1, R2, R5, R7, R12, R17, R18, R22, R28, R29, R33, R34, R37, R43, R46
511-013-150S (international)	RES, 15.0 KOHM 1/10 W 1% 0805 C SMT	R4, R6, R23, R24, R38, R41
510-013-243S	RES, 24.3 KOHM 1/10 1% C SMT	R6, R24, R41
511-013-200S	RES, 20.0 KOHM 1/10 W 1% 0805 C SMT	R8, R21, R39
511-014-511S (international)	RES, 511 KOHM 1/10 W 1% 0805 C SMT	R15, R16, R32
533-200-123S (international)	IC, DIG 74HC123D DU RETRIG MONOST M SMT	U6, U12
535-201-100S	IC, ANA LDA100 OPTO COUPLER SOLID STATE	U5, U13, U19
535-201-200 (domestic)	IC, ANA CYBERGATE 2000 DAA MODULE	U3, U10, U17
535-201-206 (international)	IC, ANA CYBERGATE 2111,DAA MOD.PAN EURO	U2, U9, U18
540-300-347S	IC, ANA LF347M QUAD BI-FET OP AMP SMT	U21
540-405-532S	IC, ANA NE5532D DUAL OP-AMP LW NOISE SMT	U1, U4, U8, U11, U14, U16
544-203-100S	SUPPRESSOR, TRANS SIDACTOR P3100SA	Q3, Q6, Q9
561-103-904S	TRANS, 2N3904 SMT	Q2, Q5, Q8
561-103-906S	TRANS, 2N3906 PNP SMT	Q1, Q4, Q7
616-101-501S	CAP, 100PF 50V CERAMIC NPO 0805 SMT	C5, C22, C36 [C5, C21, C36 international only]
616-102-101S	CAP, 1000PF 100V NPO 0805 C SMT	C1, C10, C15, C26, C29, C38
616-104-501S	CAP, 0.1UF 50V Z5U 0805 C SMT	C2, C3, C6, C7, C16, C17, C19, C20, C28, C30, C32, C34, C39, C40 [C12, C23 international only]
616-106-016S	CAP, 10UF 16V TAN 6032 C SMT	C14, C25, C35
616-474-501S	CAP, 0.47UF 50V Z5U 1812 C SMT	C4, C18, C31 [C11, C13, C27 international only]
621-100-001S	SWITCH, SPST TELCOM 8P DIP	U7, U15, U20
640-300-075S	FUSE, 3/4 AMP 250V TELECOM SMT	F1, F2, F3
678-103-002S	TEST POINT, PC MOUNT SMT	TP1, TP2
678-200-110	PIN, STRIP DUAL 2X5=10P .24 TALL R/A	J6
678-700-080S (domestic)	JUMPER, 0 OHM 0805 C SMT	R10, R26, R45

Appendix F: Warranty

Warranty

Gentner Communications Corporation (Manufacturer) warrants that this product is free of defects in both materials and workmanship. Should any part of this equipment be defective, the Manufacturer agrees, at its option, to:

A. Repair or replace any defective part free of charge (except transportation charges) for a period of one
year from the date of the original purchase, provided the owner returns the equipment to the Manufacturer at the address set forth below. No charge will be made for parts of labor during this period;

B. Furnish replacement for any defective parts in the equipment for a period of one year from the date of original
purchase. Replacement parts shall be furnished without charge, except labor and transportation.

This Warranty excludes assembled products not manufactured by the Manufacturer whether or not they are incorporated in a Manufacturer product or sold under a Manufacturer part or model number.

THIS WARRANTY IS VOID IF:

A. The equipment has been damaged by negligence, accident, act of God, or mishandling, or has not been operated in accordance with the procedures described in the operating and technical instructions; or,

B. The equipment has been altered or repaired by other than the Manufacturer or an authorized service representative of the Manufacturer; or,

C. Adaptations or accessories other than those manufactured or provided by the Manufacturer have been made or attached to the equipment which, in the determination of the Manufacturer, shall have affected the performance, safety or reliability of the equipment; or,

D. The equipment's original serial number has been modified or removed.

NO OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR USE, APPLIES TO THE EQUIPMENT, nor is any person or company authorized to assume any warranty for the Manufacturer or any other liability in connection with the sale of the Manufacturer's products.

Manufacturer does not assume any responsibility for consequential damages, expenses, or loss of revenue or property, inconvenience, or interruption in operation experienced by the customer due to a mal-

function in the purchased equipment. No warranty service performed on any product shall extend the applicable warranty period.

In case of unsatisfactory operation, the purchaser shall promptly notify the Manufacturer at the address set forth below in writing, giving full particulars as to the defects or unsatisfactory operation. Upon receipt of such notice, the Manufacturer will give instructions respecting the shipment of the equipment, or such other matters as it elects to honor this warranty as above provided. This warranty does not cover damage to the equipment during shipping and the Manufacturer assumes no responsibility for such damage. All shipping costs shall be paid by the customer.

This warranty extends only to the original purchaser and is not assignable or transferable.

Gentner Communications Corporation, 1825 Research Way, Salt Lake City, Utah 84119

Appendix G: Compliance

FCC Part 15 Compliance
This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

Changes or modifications not expressly approved by Gentner Communications Corporation could void the user's authority to operate the equipment.

FCC Part 68 Compliance
The Ringer Equivalence Number (REN) is 0.7B

A label containing, among other information, the FCC registration number and Ringer Equivalence Number (REN) for this equipment is prominently posted on the top plate, near the rear of the equipment. If requested, this information must be provided to your telephone company.
USOC Jacks: This device uses RJ11C and RJ21X terminal jacks.

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive RENs on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of the RENs should not exceed five (5). To be certain of the number of devices that may be connected to the line, as determined by the total RENs, contact the telephone company to obtain the maximum RENs for the calling area.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice is not practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice for you to make the necessary modifications in order to maintain uninterrupted service.

If you experience problems with this equipment, contact Gentner Communications Corporation, 1825 Research Way, Salt Lake City, Utah 84119, or by phone at (801) 975-7200 for repair and warranty information. If the trouble is causing harm to the telephone network, the telephone company may request you remove the equipment from the network until the problem is resolved.

No user serviceable parts are contained in this product. If damage or malfunction occurs, contact Gentner Communications for instructions on its repair or return.
This equipment cannot be used on telephone company provided coin service. Connection to Party Line Service is subject to state tariffs.

IC Compliance
This equipment has been tested and approved for Canadian compliance. At the time of this printing, the CCL DOC number has not been released.

The Load Number of this equipment is: **7**

NOTICE: The Industry of Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by Gentner Communications. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment. Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

Safety Information

Caution: For use only with certified telecommunications equipment.

Information for CTR21

The TS612 has been approved in accordance with Council Decision 98/482/EC for pan-European single terminal connection to the public switched telephone network (PSTN). However, due to differences between the individual PSTNs provided in different countries, the approval does not of itself give an unconditional assurance of successful operation on every PSTN network termination point. In the event of problems, you should contact your equipment supplier.

Network Compatibility Declaration

Gentner Communications Corporation of 1825 Research Way, Salt Lake City, Utah 84119 USA declares that the product TS612 is designed to be compatible with the following networks: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, The Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and United Kingdom.

ndex

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