TG700
Remote Control
and Connectivity

▶ Facility Integration and Remote Control Bring New Efficiency to Video Production and Broadcast

The Tektronix TG700 TV Signal Generator platform stands apart from conventional signal generators with its built-in Ethernet port, which offers a level of connectivity unprecedented in this type of instrument.

The TG700 is designed to support the next step forward in broadcasting and video production: facility integration, with control and monitoring from a remote location. A fully modular platform, the TG700 houses multiple independent signal and sync generators, serving a variety of analog, digital, and HDTV test and sync signal needs.

Via its Ethernet port, the TG700 accepts (from one or more connected PCs at a time) remote control commands, data downloads, and even signal sets through conventional network structures. Connectivity opens the door to efficient new ways of operating and managing video production and broadcast infrastructures.

At the heart of the TG700's connectivity is its ability to store an IP (Internet Protocol) address on-board, and therefore to be uniquely identified on a conventional IP-based network. The address enables the instrument to be controlled over a "network" as small as a single hard-wired PC, or as large as the Internet itself.

The remote control features of the TG700 are designed to be self-explanatory and easy to use. Fundamentally the process consists of assigning an IP address to the instrument, then accessing that instrument with any of several included applications to support file transfers, upgrades, backups, and more. The balance of this application note will explain the steps required to set up and use the TG700's remote control features.

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TG700 Remote Control and Connectivity
▶ Application Note

Remote Control Configurations for the TG700

There are two basic remote control configurations for the TG700: direct Ethernet connections and networked connections.
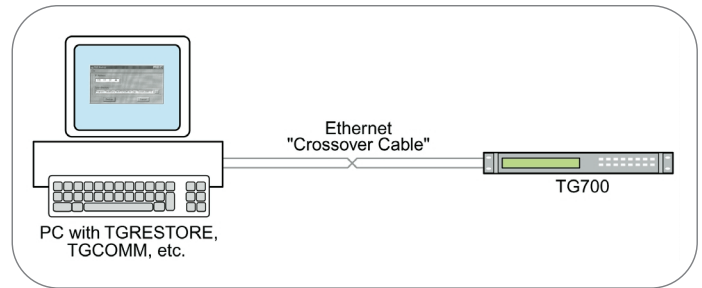
Direct Ethernet Connection

Figure 1 depicts the most basic remote control connection for the TG700. Here, the Ethernet port of the PC is "hard-wired" to the Ethernet port of the remote TG700, with no intervening hubs or network elements. This is a standard 10Base-T connection through an Ethernet crossover cable[1].

The direct connection lends itself to smaller facilities that have no in-house PC network. It is a fast, expedient way to get started with remote control. All of the TG700 remote control applications are available with no compromise in functionality. The range of the connection (the allowable Ethernet cable length) is the same as any standard 10Base-T Ethernet connection.

This direct connection is most useful for managing a remote TG700 (typically located in the equipment room) from the main control room. Frequent trips back and forth between the two rooms to adjust sync settings are a thing of the past.

It is important to note that the TG700 remote control applications (to be explained later in this document) provide useful new capabilities even if the PC and the TG700 are not physically distant from one another. Storing and downloading signal sets, logos, and setups is much more convenient with the PC, and the PC potentially has much more hard disk storage capacity than the TG700.

▶ **Figure 1.** *The direct Ethernet connection.*

Networked Connections

The TG700's built-in Ethernet connectivity enables users to connect to LANs and the Internet. Figure 2 illustrates a basic LAN connection that would be suitable for any facility that operates its own internal network. Here, any number of networked PCs can access and control the TG700. The system permits one remote controller at a time. For example, the Control Room PC might be used to generate and download logo patterns to the TG700. Later, the Chief Engineer working in his or her own office might check the status of the Genlock Module in the TG700.
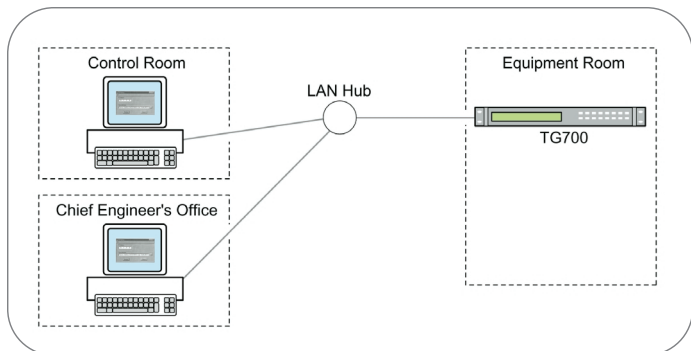
This form of connection puts the TG700 within easy reach of users throughout the facility. It also allows setup files, signal sets, and logos to be stored on a central server (not shown).

Application Tip: Remote But Not Distant

Even if the "remote" connected PC is located in the same room as the TG700, it provides a wealth of benefits.

Connecting the TG700 to a PC or network is a tremendous time-saver in everyday use of the instrument. The TG700 is a compact 1U rack-mounted instrument whose front-panel display is necessarily small. Most operations can be executed from the front panel, but the process is one of menus, submenus, and scrolling.

The TG700 remote control applications save time in scrolling and navigating through the menu structure. In addition, the connected PC offers the convenience and accuracy of keyboard text entry for file names, labels, etc. And importantly, the PC connection is the only conduit for firmware updates for the TG700.

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1. A crossover cable connects the Transmit output of the PC to the Receive input of the TG700, and vice versa.

▶ **Figure 2.** *The Local Area Network (LAN) connection permits remote control from two or more connected PCs, one at a time.*

Increasingly, there is a trend toward centralized control of affiliated broadcast stations; one master Control Room oversees several broadcast facilities in a region. Of course, these local facilities need some control over equipment such as the TG700.

The connection in Figure 3, a TG700 networked to various remote PCs via the Internet, puts sync and signal generation features at the fingertips of engineers in control rooms hundreds of miles away. Again, the full TG700 feature set is delivered in uncompromised form to one remote user at any one time. Users can check status, change setups, back up files, and more, all from the Regional Control Room.
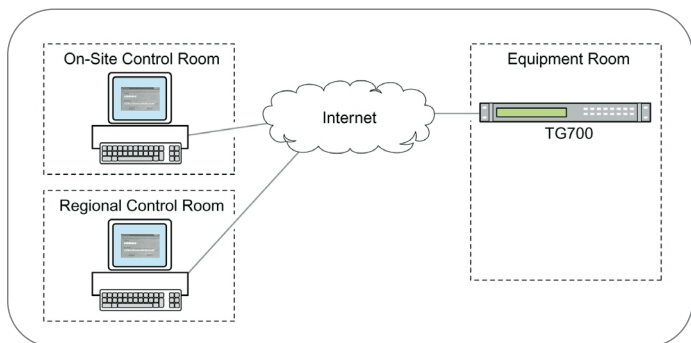
▶ **Figure 3.** *Internet connection.*

Setting Up the Connection for Remote Control

All TG700 remote control connections begin with the assignment of an IP address. This designator is made up of four sets of up to three numbers in the general form "128.1xx.xxx.xxx." Typically the address is selected from an allocation of addresses granted to an enterprise such as a broadcast corporation or production house.

There are two ways to register an IP address to the TG700: automatically, if there is Dynamic Host Configuration Protocol (DHCP) server attached to the network; or manually, if a DHCP server is unavailable.

Automatically Assigning IP Addresses Through a DHCP Server

An enterprise's "batch" of addresses is usually managed by an IT department, which houses the addresses in a DHCP server attached to the network. The TG700 can be set up to act as a DHCP client, acquiring an address automatically when it is first connected to the network.

To enable a connected TG700 to access the DHCP server, use the following steps (it is necessary to press Enter to access submenus or activate commands):

1. On the TG700 front panel, press the MODULE button repeatedly until the TG700 menu comes up on the LCD display.

2. Use the UP or DOWN arrow buttons to select the UTILITY submenu and press ENTER. The submenu appears.

3. Use the UP or DOWN arrow buttons to select NETWORK. Press ENTER.

4. Use the LEFT or RIGHT arrow buttons to select SETUP, the Network Setup submenu. Press ENTER.

5. Use the UP or DOWN arrow buttons to cycle through the submenu until you reach the DHCP item. Press ENTER.

6. Use the LEFT or RIGHT arrow buttons to select ENABLE. Press ENTER to enable DHCP.

TG700 Remote Control and Connectivity
▶ Application Note

Manually Assigning IP Addresses

If you are simply connecting a single PC to a single TG700 without a network, it is necessary to manually enter the IP address information into the TG700:

1. Follow steps 1 through 5 above.

2. When you reach the DHCP item, use the LEFT or RIGHT arrow buttons to select DISABLE. Press ENTER to Disable.

3. Use the UP or DOWN arrow buttons to cycle through the submenu until you reach the IP Address item. Enter the address. The address should be the same as that of the connected PC, with the exception of the last three-digit number. Press ENTER.

4. Use the UP or DOWN arrow buttons to cycle through the submenu until you reach the Subnet Mask item. This number should be the same as the net mask of the connected PC. If the PC has no net mask, do not enter a number. Press ENTER.

5. You may leave the other two Network Setup submenu items, Broadcast Address and Gateway Address, unchanged (default values).

If you are connecting a TG700 to a network that has no DHCP server attached, it will be necessary to get an address assigned by your enterprise's IT department, and enter the number in the Network Setup submenu item as explained above.

For more detailed information about setting up the TG700 networking parameters, see Section 3 of the TG700 User Manual.

Remote Control Applications Included with the TG700

The TG700 is shipped with a CD-ROM disc containing six remote control applications that deliver the full benefit of network connectivity. The applications are compatible with the Windows® 95, Windows® 98, Windows® NT 4.0, and Windows® 2000 operating systems, and standard Windows constructs (pull-downs, mouse clicks, desktop icons, etc.) are used throughout.

To install the applications on your PC, simply double-click the "Install.exe" icon for each application on the CD. The requisite files will be installed in default folders on the computer; or you may designate specific storage locations if you prefer.

The applications fall into two general categories. The first of these comprises the remote communication programs you will use for checking and modifying the instruments' status and for loading signal sets, logos, test patterns, etc.:
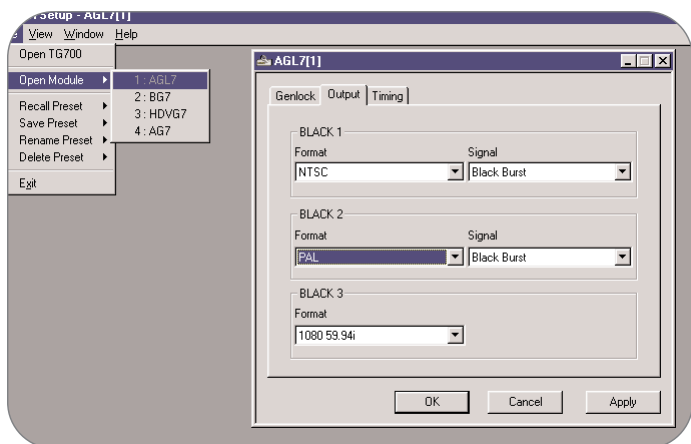
- ▶ TGSETUP
- ▶ TGCOMM

The second category encompasses the utility programs you will use for routine administrative functions such as backup and restore operations:

- ▶ TGBACKUP
- ▶ TGRESTORE
- ▶ TGDUPLICATE
- ▶ TGUPGRADE

The following explanations will use, where appropriate, the AGL7 Analog Genlock Module as the context for examples. While the popular AGL7 module provides a good basis for discussion, it is important to note that all TG700 module types and functions are equally accessible via remote control.

For more detailed information about installing and using the TG700 remote control applications, consult the TG700 User Manual.

▶ *Figure 4. TGSETUP display.*

TGSETUP

Perhaps the most frequently-used TG700 remote control application is TGSETUP. This is the means whereby an engineer in the control room can check the status of any and all modules in the TG700, and modify the settings as needed.

After opening TGSETUP by double-clicking on its desktop icon, any module's control pane can be displayed by selecting OPEN MODULE/module_name from the main File menu. The resulting AGL7 setup pane in Figure 4 immediately shows the available functions: Source, Output, and Timing.

Note that every AGL7 function is available in the remote control pane. What formerly required submenus and scrolling from the TG700 front panel now takes only a glance at the status page via remote control. The relationship of the functions, menus, and submenus is easy to understand with this simple visual display. Moreover, it is easy to access the current status of any function within seconds. Using the TG700's remote control applications can simplify and speed up routine operations even if the PC and TG700 are sitting next to each other.

Refer to the respective modules' User Manuals (bound within the TG700 User Manual), for the ranges and defaults of all module settings.

TGCOMM

The TGCOMM file transfer application provides facilities for loading signal sets, logo files, and pictures to and from the TG700. It provides a Windows Explorer-style view into the on-board memory of the TG700, instantly summarizing the memory's contents in the form of files and folders. TGCOMM allows files in the memory to be moved from folder to folder, deleted, or renamed.

In addition, TGCOMM is the proper tool for exchanging files with connected PCs. With TGCOMM, the PC's large hard drive (or that of a remote server) can extend the TG700's internal memory indefinitely.

Application Tip: TGCOMM and LOGOGEN

Included as standard equipment with the TG700 is a software package known as LOGOGEN. Its purpose is to simplify the creation of logos, station identifiers, and overlays for signal sets.

Although LOGOGEN is not part of the TG700 remote control package, it is an efficient tool thanks to TGCOMM. The LOGOGEN tool converts any chosen bitmap file to a logo or "bug." TGCOMM, using the "PC to TG" command, transfers these elements to the TG700 and stores them there. Once stored in the TG700, the logo files can be accessed through the familiar Explorer-style window described earlier.

The TG700 can "blink" the embedded logo if instructed to do so. This is a valuable feature because most digital video systems freeze the last successful frame of video on-screen when there is a problem with the transmission. The blinking logo, if present, provides instant proof the signal is still live. Blinking is activated from the TGSETUP application.

Figure 5 depicts the TGCOMM application pane. Note the pull-down File menu; the uppermost two entries are "PC to TG" and "TG to PC." Invoking either command brings up a dialog box in which you can specify the file names and destinations for sending files in either direction.
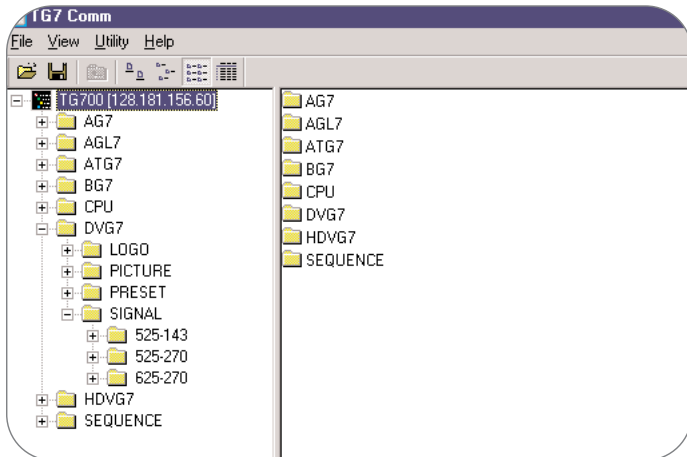

▶ **Figure 5.** *TGCOMM.*

The Explorer-style interface offers drag-and-drop manipulation of the files and folders displayed within the pane. TGCOMM, like TGSETUP, enables you to use the TG700 more efficiently.

Before TGCOMM can transfer files to a TG700, you must set the IP address of the target TG700 in the TGCOMM application as well as in the TG700 itself. The Network entry in the application's Utility menu opens a dialog box for this information.

TGBACKUP

The TGBACKUP application is optimized to capture the presets (user settings) of the TG700 mainframe and all of its installed modules. The process is virtually error-proof: simply type in the IP address of the TG700, designate a Save Directory on the connected PC, and mouse-click the on-screen "Backup" button. Figure 6 illustrates a TGBACKUP screen.

TGBACKUP saves all the settings you have configured in the various module menus; in the example of the AGL7 module, these settings would include the Source, Output, and Timing attributes. Firmware in the TG700 and its modules is not affected.
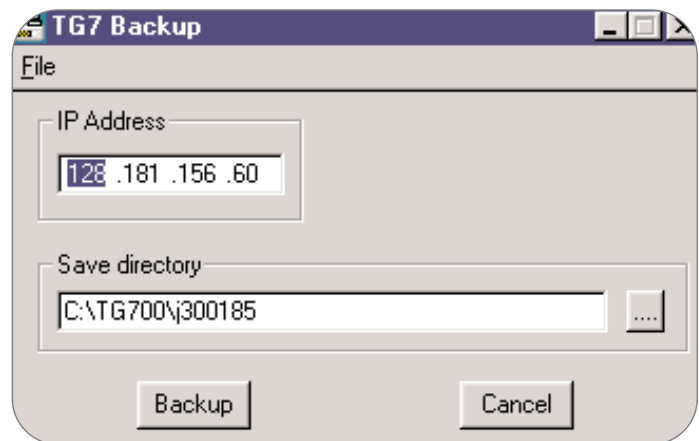
▶ **Figure 6.** *TGBACKUP.*

### Application Tip: Two Sync Sources Are Better Than One

In revenue-critical broadcast operations, it is a common precaution to team a TG700 with an identical backup unit, and couple the two with an emergency changeover unit such as the Tektronix ECO422D. This level of redundancy ensures that there will always be a properly timed sync signal available, even if the main signal generato r suffers a catastrophic failure.

TGDUPLICATE offers an expedient way to "clone" the main TG700 into a second TG700 for redundancy p accurate in that there is no chance of overlooking some parameter or execution step. Every bit of stored data in the main TG700 (except for the IP address!) is transferred to the secondary unit automatically by TGDUPLICATE.

TGRESTORE

TGRESTORE is, as its name implies, the converse of the TGBACKUP application. TGRESTORE copies the backed-up presets from the computer to the TG700. See Figure 7.

The TGBACKUP/TGRESTORE tools make it easy to acquire, archive, and restore "safety" copies of the TG700's settings. The two applications work together to support archiving and efficient record-keeping consistent with today's video business processes, service level agreements, and so on.
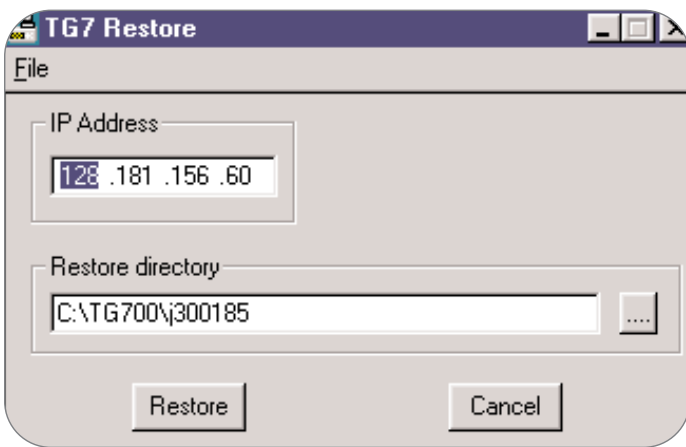

▶ *Figure 7.* TGRESTORE.

TGDUPLICATE

Unlike TGBACKUP, the TGDUPLICATE application copies both presets and firmware contents between two discrete TG700s connected to a network via their Ethernet ports. Both TG700 units must of course have the same memory size and hardware configuration.

TGDUPLICATE is not a transfer of data from the PC to either of the TG700 units. The computer simply invokes and controls the transfer. Like the other remote control applications, a simple dialog box (Figure 8) carries out the operation.
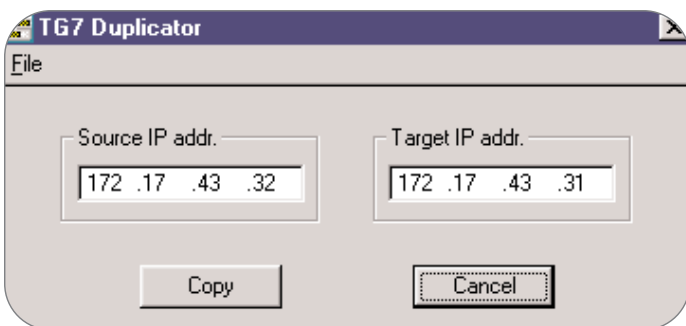
▶ *Figure 8.* TGDUPLICATE.

TGUPGRADE

Tektronix issues periodic firmware enhancements for many of its products, including the TG700 and its modules. TGUPGRADE allows you to install firmware upgrades directly from a Tektronix-provided CD-ROM, or from files stored on the hard disk of a connected PC or server. Compared to earlier equipment that required installing hardware ROM devices, the TGUPGRADE application dramatically simplifies the process of updating a firmware-based instrument like the TG700. See Figure 9.
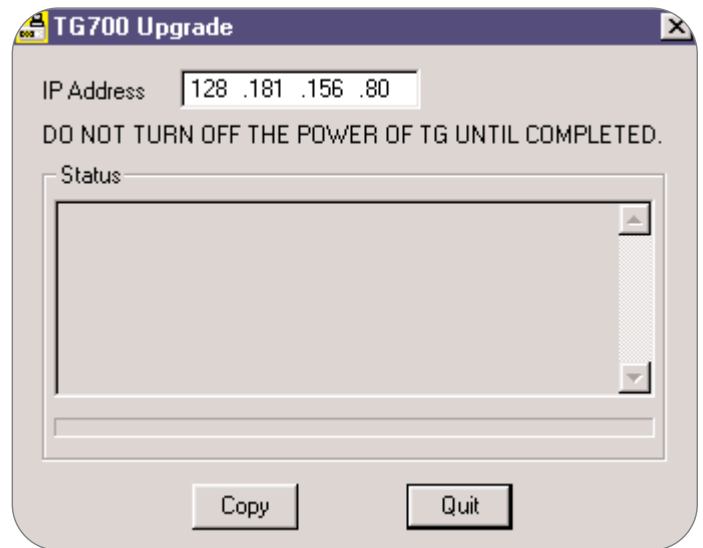
▶ *Figure 9.* TGUPGRADE.

Summary

The TG700, with its ability to control video sync and signal generation functions remotely, answers a long-standing need in the production and broadcast industries. By providing tools to check and modify the generator's status, back up critical settings, and manipulate stored data via a network connection, the TG700 takes the video industry to the next level of efficiency and economy.

TG700 Remote Control and Connectivity
▶ Application Note

For Further Information

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology.

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