Model 844
FM/Stereo Modulation Monitor. The industry's newest FM baseband and stereo monitor... in one 7" package. The 844 features a 2-channel preselector for off-air monitoring and comprehensive front-panel measuring capabilities. Auxiliary composite input allows stereo generator and composite STL checks. The 844's unique Peak Modulation Duration Differentiator (PMDD) circuit (patent pending) detects only true over-modulation spikes and ignores those created by transients, multi-path, and overshoot. Companion SCA Monitor: Model 845 (Available Fall 1985).

Model 850
Aural Modulation Monitor for BTSC TV Stereo. Complies fully with the BTSC Aural Modulation Monitor Standards for recommended measurements and more. Look at total modulation, main channel, left or right channel. Microprocessor-controlled switching permits measurement of over 20 parameters. Both split-sound and quasi-parallel (intercarrier mode) demodulation schemes are used to recover the aural baseband signal. Accommodates optional AA501 Distortion Analyzer.

Model 8500
Composite Subcarrier Generator for BTSC Stereo. The 8500 Generator combines the output of a BTSC Stereo Generator, SAP Generator, Pro-Channel Generator, and SCA Generator or Remote Control link, for transmission via a single video microwave subchannel.

Model 8501
Composite Subcarrier Demodulator for BTSC Stereo. The 8501 Demodulator routes the composite stereo and SAP to the aural exciter; the remaining channels are then available for station use.

Model 8300 STL
Aural STL and Inter City Relay. When it comes to transporting the cleanest, most transparent audio via microwave, the 8300 system is ahead of the rest... even in dense RF environments. If multihop links are involved, the 8300 with its unique IF repeater circuitry ensures the audio quality at the origin is relayed through 3, 4, 5 hops to the RF transmitter. The 8300's economical counterpart is the 7700 STL. Available in mono, dual mono, or composite configurations, without degrading separation, deteriorating signal-to-noise or adding distortion.

Model 8100 TSL
Transmitter-Studio Data Link (TSL). The 8100 provides a cost-effective data return link without occupying a revenue-producing SCA channel. Operates in 450 MHz band, 4 watts nominal output. Optional Morse Code identifier available.

See Reverse
Model 753
AM Modulation Monitor. Shown with the optional 754 4-channel preselector. The 753 guarantees you the most out of your AM transmitter . . . right up to the legal limit.

Model 840
C-Quam® Exciter for AM Stereo. Second-generation design with ease of utility and maintainability at a competitive price to make you competitive in the rough world of AM Stereo radio.
C-Quam® is a registered trademark of Motorola, Inc.

Model 701
TV Monitor. The 701 still outsells its rivals after 15 years! A precision monitor for visual and aural carrier frequencies and aural modulation. CCIR option available.

System 7610
Remote Control System. The most economical method of manipulating your transmitter via TELCO or STL. Basic system provides 10 channels each of Raise, Lower, and telemetry. Flexible expansion capability by adding subsidiary units.

System 7815
Remote Control and Status Monitoring System. Offers 15 on/off control and 15 status indication channels. The 7815 is expandable to 45 channels of control and 79 channels of status indications.

Series 760 EBS
EBS System. The most popular EBS Receiver/Generator/Decoder system . . . literally thousands in use daily. Meets FCC requirements. Complete system or fractional packages are available.

AM/FM/TV MONITORS
BTSC AURAL TV
STL/TSL
REMOTE CONTROL
EBS

SHORT FORM CATALOG

... Where new things are happening!
3090 Oakmead Village Drive, Santa Clara, CA 95051
Phone: (408) 727-7272 TWX: 910-338-0584

David Kerstin
PRO AUDIO GENERAL STORE, INC.
746 Cypress Lane
Carol Stream, IL 60187
312-231-7120
FEATURES

☐ Independent SAP and Professional Channel Sections
☐ Separate Meters for Modulation and Injection
☐ Off-Frequency LED Indicators
☐ Selectable Operating Modes:
   - Switchable bandpass filter for operation with subcarriers individually (when performing a Proof) or with entire composite signal.
   - Switchable dbx* decoder or 75 μsec de-emphasis, or flat response (15 kHz bandwidth) in SAP Channel.
   - Switchable de-emphasis (150 μsec de-emphasis or flat, 6 kHz bandwidth, in Pro Channel for data or voice applications.
☐ Peak Modulation Flashers with Thumbwheel Switch Presets.
☐ Built-in Frequency-Synthesized Modulation Calibrator.
☐ Demodulated Signals available via Front Panel BNC.

GENERAL DESCRIPTION

COMPLETE BTSC MONITORING/FULL COMPLIANCE WITH BTSC RECOMMENDED PRACTICES

The TFT Model 855 BTSC SAP and Pro Channel Modulation Monitor was designed for those broadcasters who utilize the Second Audio Program (SAP) and/or Professional Channel (Pro) as part of their BTSC broadcast signal. It is designed to monitor and measure SAP and Pro Channel performance characteristics as defined by the EIA/BTSC System Multichannel Television Sound Recommended Practices. It can also be used to check the performance of SAP/Pro generators.

The 855 can accept signals from any source of BTSC composite signal consisting of SAP/Pro—such as the feed from the TFT Models 850 or 851 BTSC stereo monitors or other wideband audio demodulator—or can accept signals from SAP and Pro generators directly.

The 855 incorporates independent SAP and Pro Channel sections. Each section includes separate modulation and injection meters and peak modulation flashers. Switchable modes permit extensive monitoring and measurement flexibility. A front panel BNC output provides convenient connection of monitored signals to ancillary test equipment, such as TFT’s Model 860 Multifunction Audio Analyzer which plugs into the TFT 850/851 BTSC Stereo Modulation Monitors.

Positive and negative peak flashers with thumbwheel presets incorporate TFT’s exclusive PMDD (Peak Modulation Duration Differentiator) circuitry to accurately register signal peaks.

Off-frequency LED’s warn of carrier drift beyond ± 500 Hz.

The 855 incorporates a built-in synthesized type modulation calibrator to ensure monitor accuracy, year after year. Separate injection calibration trimmers aid in monitor set-up.

*dbx is a registered trademark of dbx, Corp.
**INPUT**

Composite Audio ............ 75 ohms unbalanced, 0.5 – 2.0 VRMS (from TFT Models 850 or 851, Tektronix 1450, etc.), BNC.

Frequency Range ............. 50 kHz to 125 kHz.

**METERS**

SAP Channel Modulation ....... Meter ballistics meet BTSC requirements, 0–130% calibration.

Pro Channel Modulation ... Same as above.

SAP Channel Injection Error Zero center meter, calibrated in ± 30% error from BTSC standard of 15 kHz injection.

Pro Channel Injection Error Same as above, except reference injection is 3 kHz.

**PEAK MODULATION INDICATORS**

Four peak flasher LED's indicate plus or minus peaks simultaneously for SAP and Pro Channels. Peak limits set by thumbwheel switches in 1.0% increments from 0% to 199%. Accuracy, ± 1.0%.

**MODULATION LEVEL CALIBRATOR**

Built-in frequency-synthesized type calibrator for meter and peak flasher calibration (100% modulation) from the front panel. Accuracy, ± 1.0%.

**OUTPUTS**

Front Panel BNC

SAP Carrier ............. 260 mV into 5k ohms, for external frequency counter, etc.

Pro Channel Carrier .... Same as above.

Composite Input ........ Buffered input signal; approx. 1.5 VRMS into 5k ohms.

SAP Channel Modulation 1.77 VRMS, 75 ohms unbalanced at 100% modulation, follows decoder/75 μsec/flat pushbutton selection.

Pro Channel Modulation Same as above, follows 6 kHz flat/150 μsec pushbutton selection.

Rear Panel

SAP Channel Audio .... 3.54 VRMS, balanced 600 ohms, rear panel barrier strip.

Pro Channel Audio .... Same as above.

**ALARMS**

Separate alarm outputs for SAP and Pro Channels.

Off-Frequency ............ + 12 VDC output when subcarrier is off-frequency by more than 500 Hz.

Carrier Alarm .......... Relay contact closure when subcarrier falls below muting level.

Modulation Alarm ........ Relay contact closure when modulation drops below 10% for more than 30 seconds.

Remote Meter Panel .......... Barrier strip terminals.

**SUBCARRIER MEASUREMENTS**

*Frequency Response:
SAP Channel ... 30 Hz to 10 kHz, ± 0.5 dB
Pro Channel ... 30 Hz to 3 kHz, ± 10 dB

*Distortion ............ 0.5%

*Signal-to-noise Ratio:
SAP Channel ... 60 dB, de-emphasized
Pro Channel ... 85 dB, with dbx decoding

Crosstalk:
Stereo to SAP Channel ... 60 dB
Stereo to Pro Channel ... 60 dB
SAP to Stereo ... 66 dB
Pro Channel to Stereo ... 66 dB

*Measurements taken using wideband mode.

**MECHANICAL & ENVIRONMENTAL**

Input Power ............ 115/230 ± 10% VAC, 50 to 400 Hz, 30 watts max.

Operating Temperature .... 0° to 50° C (32° to 122° F)

Size ..................... 5½" (13.3 cm) High × 19" (48.3 cm) Wide × 14¾" (37.5 cm) Deep.

Net Weight ............ Approximately 11 pounds

Shipping Weight .......... Approximately 14 pounds.

**ORDERING GUIDE**

Model 855 SAP/Pro Modulation Monitor
Option 01 (TFT Part Number 7100-4133) Remote Meter & Flasher Panel
Option 02 (TFT Part Number 7100-4134) Spare Parts Kit

3090 Oakmead Village Drive
P.O. Box 58088
Santa Clara, California 95052-8088

(408) 727-7272
TWX: 910-338-0584
FAX: (408) 727-5942

878552M Printed in U.S.A.
Features

- Microprocessor Performs Controls and Computations
- Audio Frequency Counter Built-in
- Fully Automatic: No Level Setting, Tuning or Nulling
- Digital AC Voltmeter displays V, mV, µV or dBm
- Total Harmonic Distortion and dB Ratio Measurements
- Total System Harmonic Distortion Plus Noise (0.0025%)
- (3 µV Residual Noise
- Automatic Calibration of AC Level

Description

The Model 860 is a microprocessor-controlled Distortion Analyzer, AC Level Voltmeter and Ratio Meter. The microprocessor in the Model 860 is programmed to read level and frequency of the signal being tested and to compute the level in dBm, harmonics to fundamental signal ratio, and to display the computed THD, dBm and frequency. It provides completely automatic measurement of level, total harmonic distortion plus noise (THD + N), ratio of two voltages, and audio frequency. Automatic set level, automatic tuning, automatic nulling of the fundamental, and autoranging of the display all combine to permit completely hands-off operation once the mode is selected. Just apply the signal of interest and read the 16 digit alphanumeric LCD display.

DB ratio measurements may be referenced either to 7746 millivolts (1 milliwatt in 600 ohms) or to a selected applied signal. The 0 dB reference memory remembers the selected level, and all subsequent measurements are referenced to that level. The Model 860 allows readings to be expressed in true RMS or average response, RMS calibrated. Although true RMS is more accurate in most applications, the average response permits comparisons with measurements previously taken with older instrumentation.

The fundamental frequency range of the Model 860 is 10 Hz to 100 kHz, with harmonics measured out to 300 kHz.

Any one of the built-in 400 Hz high pass, 80 kHz low pass and 30 kHz low pass filters may be switched into the signal paths for preconditioning of the signal to be measured.

An Input Monitor connector and a Function Output connector are provided to permit oscilloscope display of the input signal or the result of the filter in the THD + N measurement.

...Where new things are happening!

3090 Oakmead Village Drive, Santa Clara, CA 95051
Phone (408) 727-7272  TWX 910-338-0584  FAX (408) 727-5942
### DOMESTIC PRICE LIST
#### TELEVISION BROADCAST EQUIPMENT

**Effective: 2 MAR 87**

<table>
<thead>
<tr>
<th>MONITORS</th>
<th>DESCRIPTION</th>
<th>Price (U.S. Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL 850</strong> (5116-0850)</td>
<td>BTSC AURAL MODULATION MONITOR, Rack Mount Specify Channel and De-emphasis</td>
<td>$10,350.00</td>
</tr>
<tr>
<td>Option 01 (7100-4010)</td>
<td>Distortion Analyzer</td>
<td>$2,990.00</td>
</tr>
<tr>
<td>Option 02 (7100-4020)</td>
<td>Remote Meter &amp; Flasher Panel for Model 850</td>
<td>$595.00</td>
</tr>
<tr>
<td>Option 03 (7100-4050)</td>
<td>Spare Parts Kit for Model 850</td>
<td>$1,025.00</td>
</tr>
<tr>
<td>Option 04 (7100-4110)</td>
<td>Alarm (Carrier &amp; Modulation) with 2 MUX filters</td>
<td>*$ 840.00</td>
</tr>
<tr>
<td><strong>MODEL 851</strong> (5116-0851)</td>
<td>BTSC AURAL MODULATION MONITOR, Rack Mount Baseband input only. Specify De-emphasis.</td>
<td>$8,750.00</td>
</tr>
<tr>
<td>Option 01 (7100-4010)</td>
<td>Distortion Analyzer</td>
<td>$2,990.00</td>
</tr>
<tr>
<td>Option 02 (7100-4020)</td>
<td>Remote Meter &amp; Flasher Panel for Model 851</td>
<td>$595.00</td>
</tr>
<tr>
<td>Option 03 (7100-4132)</td>
<td>Spare Parts Kit for Model 851</td>
<td>$824.00</td>
</tr>
<tr>
<td>Option 04 (7100-4110)</td>
<td>Modulation Alarm with 2 MUX filters</td>
<td>*$ 815.00</td>
</tr>
<tr>
<td><strong>MODEL 855</strong> (5116-0855)</td>
<td>SAP/PRO MODULATION MONITOR, Rack Mount</td>
<td>$3,950.00</td>
</tr>
<tr>
<td>Option 01 (7100-4133)</td>
<td>Remote Meter &amp; Flasher Panel for Model 855</td>
<td>$595.00</td>
</tr>
<tr>
<td>Option 02 (7100-4134)</td>
<td>Spare Parts Kit for Model 855</td>
<td>$410.00</td>
</tr>
</tbody>
</table>

**NOTE:** WHEN AN 850 OR 851 IS PURCHASED TOGETHER WITH AN 855, A $1,000.00 ALLOWANCE OFF THE 850 OR 851 LIST PRICE IS MADE.

<table>
<thead>
<tr>
<th>MONITORS</th>
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<th>Price (U.S. Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL 701</strong> (5116-0701)</td>
<td>TV FREQUENCY &amp; AURAL MODULATION MONITOR Rack Mount. Specify Channel &amp; Offset</td>
<td>$8,950.00</td>
</tr>
<tr>
<td>Option 02 (7100-0050)</td>
<td>Alarm (frequency and modulation)</td>
<td>*$ 625.00</td>
</tr>
<tr>
<td>Option 03 (7100-0010)</td>
<td>SCA Output</td>
<td>$585.00</td>
</tr>
<tr>
<td>Option 06 (7100-4060)</td>
<td>Automatic Logging Output (BCD)</td>
<td>$420.00</td>
</tr>
<tr>
<td>Option 07 (7100-0030)</td>
<td>CCIR Format</td>
<td>*$ 1,255.00</td>
</tr>
<tr>
<td>Option 08 (7100-0060)</td>
<td>Spare Parts Kit</td>
<td>$885.00</td>
</tr>
<tr>
<td><strong>MODEL 704</strong> (5116-0704)</td>
<td>REMOTE METER AND PEAK FLASHER PANEL FOR 701</td>
<td>$540.00</td>
</tr>
</tbody>
</table>

* Not field installable
TELEVISION BROADCAST PRODUCTS

COMPOSITE SUBCARRIER SYSTEM

Subcarrier system for video STL to convey BTSC stereo, SAP and Pro channels on a single video subcarrier. A system comprises one (1) 8500 and one (1) 8501.

<table>
<thead>
<tr>
<th>MODEL 8500 (5116-8500)</th>
<th>Subcarrier Generator only. Specify frequency of 6.2, 6.8, or 7.5 MHz. Others between 5 MHz and 10 MHz, special order.</th>
<th>$ 2,580.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL 8501 (5116-8501)</td>
<td>Subcarrier Demodulator only. Specify frequency of 6.2, 6.8, or 7.5 MHz. Others between 5 MHz and 10 MHz, special order.</td>
<td>$ 3,870.00</td>
</tr>
<tr>
<td>Option 01 (7100-4040)</td>
<td>Spare Parts Kit for 8500 System</td>
<td>$ 595.00</td>
</tr>
</tbody>
</table>

TERMS OF SALE

All shipments are made F.O.B. Santa Clara, California. Terms are net 30 days to customers who have a satisfactory established line of credit with us. Others should arrange with the factory for payment at the time of shipment.

WARRANTY

TFT, Inc. warrants each of the instruments of its manufacture to be produced to meet the specifications delivered to the BUYER; and to be free from defects in material and workmanship; and will repair or replace at its expense, for a period of one year from the date of delivery of equipment, any parts which are defective from faulty material or workmanship. Equipment, accessories, tubes and batteries not manufactured by TFT are subject to only such warranties as those listed by the manufacturer.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charge prepaid by the BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER, prior to such return. Upon examination by the factory, if the instrument is found to be defective, the unit will be repaired and returned to the BUYER, with transportation charges prepaid by SELLER.

Transportation charges for instruments found to be defective within the first thirty (30) days of warranty period will be paid both ways by the SELLER.

Transportation charges for warranty returns and repair costs, wherein failure is found not to be the fault of the SELLER, shall be paid both ways by the BUYER.

This warranty does not apply to instruments which, in the opinion of the SELLER, have been altered or misused. No other warranty is expressed or implied. SELLER SPECIFICALLY EXCLUDES AND DISCLAIMS ANY WARRANTY FOR FITNESS OR PURPOSE AND MERCHANTABILITY. IN NO EVENT SHALL SELLER BE RESPONSIBLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES.

CONTENTS SUBJECT TO CHANGE WITHOUT NOTICE
WHY ARE MORE STATIONS BUYING TFT STL'S?

HIGHER RELIABILITY & TWICE THE WARRANTY.
We love to see the surprised expressions on a seasoned engineer's face when they look inside our STL's:
"Where's all the complicated daisy-chained modules like other STL's?"
Because TFT's patented STL design achieves high performance with much fewer components (doing lots of very clever things), it also provides higher reliability too. Our low component count means a higher MTBF. Our extensive 9 step Quality Control and lengthy 144 hour burn-in is an additional guarantee you're getting the most reliable STL's made.
We back-up this claim with an exclusive two year warranty — twice as long as any other!

COMPREHENSIVE SELECTION
We have the largest selection of high-performance aural STL systems. . . including the Model 8300 & 7700B Composites, discrete versions, the economical new 8600, exclusive IF repeaters and On-Channel boosters, and all the accessory gear you need for a complete, state-of-the-art, aural microwave system.
If we don't have it, you don't need it!

ON-CALL SUPPORT, 24 HOURS-A-DAY.
Behind all our STL's is a responsive support and service team you may never need—but it's nice to know the factory has technically knowledgable people to help you—24 hours a day, 7 days a week.

PERFORMANCE & FEATURES.
Our higher reliability, comprehensive selection and responsive support system is meaningless if our STL's didn't give you the performance you demand. Compare our specs and features with our competitors.
A TFT STL is equal or better—in every critical parameter, at a very competitive price!
Contact us or your favorite TFT dealer now for full technical information including our free STL Engineering Guide,
A Primer: Aural Microwave Links.
A SUPERIOR AURAL STL SYSTEM FOR EVERY JOB.

MODEL 7700B STL

The 7700B is the 8300's economical counterpart. Available in composite, mono, or dual mono configurations without degradation to separation, deteriorated signal-to-noise or added distortion. As with the 8300 Series, an AM Stereo Decoder is optional and provides L & R channel outputs when used with a standard FM Stereo Generator.

MODEL 8300 COMPOSITE STL

When it comes to transporting the cleanest, most transparent audio via microwave, the 8300 Composite STL system is ahead of the rest... even in dense RF environments. If multihop links are involved, the 8300 features exclusive IF repeater circuitry to ensure audio quality at the origin is relayed and maintained through 3/4, (or more!) hops to the transmitter.

MODEL 8600 DISCRETE STL

The Model 8600 STL is an economical, discrete 950 mHz system derived from our top-of-the-line 8300 Composite system. Ideal for congested area drop-ins. Designed for either single or dual monaural operation, it features a built-in subcarrier generator and demodulator for voice or data, spurious-free power amp, built-in mic and headphone jacks and the capability to properly match phase and gain between dual links for either AM stereo or FM stereo applications.

In addition to the above systems, we have:

- IF Repeaters
- On-Channel Boosters
- High-Isolation Transmitter Combiner & Receiver Splitters
- Hot-Standby with Automatic Crossover Units
- TSL 450 MHz Return Links
- All accessories including antennas, transmission lines, connectors, pigtails, isocouplers, etc.
7700B SERIES
BROADCAST QUALITY AURAL STUDIO TRANSMITTER LINK AND INTER-CITY RELAY SYSTEM

For: 140-175 MHz*, 200-240 MHz*, 300-330 MHz, 400-470 MHz, 806-960 MHz

*Customized order
Innovation helps make TFT a performance leader in Studio-Transmitter-Links and Inter-City Relays

TFT designs, manufacturers, markets and services Broadcast Quality STL's and Inter-City Relays for Stereo, Monaural, and Multi-Channel program audio applications.

Since the introduction of the 7700 Series, over a thousand units have been installed and operational in the United States and worldwide. This equipment is also frequently used for voice and data transmission where low intermodulation and superior group delays are required. It is the best performing equipment in its price range. The 7700B is the third generation of this Series.

Why STL?

STL represents the best alternative to telephone lines in three important areas:

1. **Quality**: Since telephone lines were designed primarily for voice transmission, their audio quality is minimal. Even the compensated lines are not adequate for most of today's stereo performance requirements. TFT's STL and Inter City Relays, on the other hand, are designed primarily for broadcast and take into account the many specialized requirements of that medium.

2. **Reliability**: With STL you are no longer at the mercy of telephone companies which you cannot control.

3. **Economy**: The cost of telephone lines are increasing. Once you own an STL, level amortization and small maintenance costs are all you pay.

   All of these factors make owning an STL both a practical and economically sound decision.

   Tone burst test of the STL system demonstrates true signal reproduction with no overshoot. Top trace: 15 kHz tone burst input to the transmitter. Bottom trace: output from the receiver.

Why 7700B Series?

The full fidelity performance of today's receivers and FM Stereo and AM Stereo receivers has put new requirements on broadcast equipment. The link between the broadcast studio and the transmitter is as important as the broadcast transmitter itself. TFT STL's are designed with broadcast applications in mind using state-of-the-art RF and digital technology. Some of the innovations in the 7700B Series STL include:

**IF Modulated Transmitter**: Improves signal to noise ratio and stereo performance by providing low distortion and high stereo performance.

**Hot Standby**: A fully redundant receiver and transmitter are available, both with automatic transfer and alarm, which provides maximum security across the system.

**Modular Construction**: Modular construction in the transmitter and receiver contribute to low maintenance cost and ease of field servicing.

**Ease of Maintenance**: All tuning adjustments are easily accessible through top of transmitter and receiver modules.

**Front Panel Metering**: Audio output level, sub-carrier level and RF input level in microvolts may all be monitored directly from the front panel.

**RFI Protected**: In the last six years, the 7700 Series has been field tested in the most adverse environments at transmitter sites worldwide. All have achieved excellent field test results.

**A Wide Selection of Frequency Ranges**: Provides STL capability for most foreign and domestic systems.

*Field test data and results are available upon request.*
Specifications

System

Frequency Ranges
- 140-175 MHz, 200-240 MHz
- 300-330 MHz, 400-410 MHz
- 806-960 MHz

Baseband Frequency Response:
- Program Audio: Composite: 50 Hz - 7 kHz
  Monaural: 50 Hz - 15 kHz
- Multiplex: Composite: 110 to 220 kHz
  Monaural: 39 to 67 kHz

Harmonic and Intermodulation Distortion
- Composite: 0.2% at 1 kHz, 25% from 30 Hz to 75 kHz
  Monaural: 0.2% from 30 Hz to 15 kHz

Receiver

AM
- Temperature: 400-470 MHz, 300-330 MHz, 200-240 MHz, 140-175 MHz
- RF Input Connector: Sensitivity (de-emphasized) 60 dB at 5% Min.
  Signal to Noise: 1 mV RF input without de-emphasis 1 mV input with 15u Sec de-emphasis
- Selectivity (3-dB BW): 300 kHz, 1.4 kHz
- AM Rejection (400 Hz @ 1%) 55 dB Min.
- Spurious and Image Rejection: +10 dBm (2.48 V RMS) into 600 ohm balanced +4 dBm (1.24 V RMS)
  into 600 ohm unbalanced.
- Demodulated Outputs Program

Multiplex

Harmonic Distortion
- Main to Sub: 0.2 dB
- Sub to Main: 0.2 dB
- Baseband Response: ±0.2 dB
- Modulation: 0.5 dB

Cross talk
- Main to Sub: ≤0.2 dB
- Sub to Main: ≤0.5 dB

Power Requirements

Common to Composite and Monaural Models
- 1 A at 24 VDC, 0.5 A at 115 VAC
- Temperature Range: -10°C to +50°C
- Dimensions: 3.25" (8.3 cm) H x 19" (48.3 cm) W x 15.5" (39.4 cm) D
- Weight: 10 ½ lb.

Transmitter

Frequency Range (MHz)
- RF Power Output (watts, max): 806-960

Output Connector

Frequency Stability (ppm/yr)
- Frequency Accuracy:
  0°C to 45°C ≤0.00001% ±0.0005% ±0.0005%
- -10°C to +50°C

Spurious Signal Suppression
- Non-Harmonically Related (dB)
- Harmonically Related (dB)
- Frequency Dev. for 100% Mod.
  Composite + Monaural (kHz)
  Multiplex Channels (kHz)
  Distortion (dBm)

Modulation Input Levels:
- Composite: ≤12 ≤12
- Multiplex (V rms): +10 dBm +10 dBm
- AC Line Power (watts)*: 0.33 0.33
- Operating Temperature Range (°C)

Dimensions:
- Height: 5.25" (13.3 cm)
- Width: (13.3 cm)
- Depth: 19" (48.3 cm)
- Weight (pounds) (kilograms): 13.1 13.1

* 10 k-ohm input.
** 120/240 VAC, 50-60 Hz.
The Transmitter

The rugged TFT 7700B Series transmitter represents a new approach to STL transmitter design, providing a vast improvement in S/N ratio and frequency stability over conventional systems. Outstanding features include:

**Features**

- **IF Modulation:** The carrier modulation is applied to an IF frequency between 38 MHz and 48 MHz to achieve excellent signal to noise ratio and stereo performance. The final carrier frequency is obtained by heterodyning the IF against a stable frequency source.
- **High Output Power:** The 12-watt output at 960 MHz (20 watts at other frequencies) generates more useable signal for long or difficult transmission paths and provides higher fade margins.
- **Adjustable Output:** Power can be adjusted from 3 watts to maximum power output, allowing you to meet your exact requirements.
- **Fully Protected:** The output is fully protected against short circuits and high VSWR.
- **Excellent Frequency Stability:** Frequency synthesized carrier provides frequency stability of ±1 ppm/year as well as making it easier to change operating frequencies in the field.
- **Accommodates Two Additional Subcarriers:** Two FM subcarriers can be inserted in addition to the main and stereo channels.
- **No Subcarrier Beats:** 19 kHz harmonically related subcarrier frequencies are chosen in order to eliminate subcarrier intermodulation products.

Transmitter Block Diagram
The design of the all-new TFT 7700B Series receiver incorporates several unique features that provide low noise, high gain and great versatility. All receivers allow for automatic change-over to stand-by in the event of a detected malfunction.

**Features**

- **Crystal controlled triple conversion superheterodyne design**: This provides selectivity, gain and stability in the receiver.
- **Low Noise RF Amplifier**: A high gain, low noise RF amplifier provides a 3.5 dB noise figure.
- **Pulse-counting Discriminator**: A unique pulse-counting discriminator circuit provides ultra-linear FM demodulation to achieve low harmonic and intermodulation distortion.
- **Receiver Automatic Changeover**: Switching to the hot standby receiver is done automatically if a failure occurs.
- **Remote Operation and Status Check**: Studio engineers can interrogate the receiver over existing remote control equipment to determine receiver change-over and ascertain which receiver is operational. Receiver switching can also be done by remote command.
- **Wide and Narrow Bandwidth IF**: Both wide-band and narrow band IF are available for either composite or monaural applications. Super sharp IF filters are available for 125 kHz channel spacings.
Applications

The broadband characteristics of the TFT 7700B Series STL systems allow for many specialized applications beyond the standard aural studio-transmitter link for a composite stereo baseband signal. Among these are:

- **InterCity Relay Systems**: By interconnecting a number of STL systems in series, broadcast quality audio links between cities may be achieved, providing high quality stereo or multi-channel audio service to each city.

- **Remote Control**: With the addition of an FM subcarrier, 7700B series STL can carry remote control signals from the studio to the transmitter site.

- **SCA Channel**: A background music service or data channel can be transmitted via the 7700B Series STL by using the second FM Subcarrier.

- **AM Stereo**: With a TFT designed built-in stereo decoder (Opt. 15), the 7700B Series can provide L and R channel output when the transmitter is used in conjunction with a standard FM stereo generator.

A TFT STL Application Guide for equipment selection and path calculations is available upon request.

Accessories & Options

**Model 7770 Transmitter Automatic Change-over**: This is a 1-3/4" rack mount unit which monitors critical parameters in the transmitters. If a fault is detected, it automatically switches to the hot standby transmitter. Change-over can also be accomplished by a front panel switch or relay contact closure in the remote control equipment. The unit is self-powered and switches RF output to the antenna.

**Model 7773 Receiver Automatic Change-over**: Similar to the Model 7770, Model 7773 monitors the parameters in the receivers. The unit switches the program channel output as well as both subcarrier outputs.

**Frequency Division Multiplex (FDM) Baseband Encoder and Decoder**: Multiple broadcast programs can be transmitted with full audio bandwidth by using the FDM encoder and decoder. A data sheet for the FDM equipment is available upon request.

**Other Accessories**: TFT carries a full line of accessories such as coaxial cable, type N connectors and antennas to meet STL system installation requirements. Please refer to STL price list for detailed information.

**Stereo Decoder (option 15)**: Built-in stereo board for decoding left and right channels. (For AM stereo application.)

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**STL EQUIPMENT SELECTION GUIDE**

<table>
<thead>
<tr>
<th>SYSTEM DESCRIPTION</th>
<th>NUMBER OF TRANSMITTERS REQUIRED</th>
<th>NUMBER OF RECEIVERS REQUIRED</th>
<th>FOR HOT STANDBY SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>A SINGLE COMPOSITE</td>
<td>1</td>
<td>1</td>
<td>7770 For Transmitter</td>
</tr>
<tr>
<td>B DUAL COMPOSITE</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7770 For Transmitter</td>
<td>7773* For Receiver</td>
</tr>
<tr>
<td>C SINGLE MONOURAL</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>D DUAL MONOURAL</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7770 For Transmitter</td>
<td>7773* For Receiver</td>
</tr>
<tr>
<td>E DUAL CHANNEL IN</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>PARALLEL OPERATION</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

*Model 7773 includes a power splitter for parallel operation of dual monaural receivers*
FEATURES

- Three major sub-systems in one package:
  - Frequency-Agile RF Pre-Selector
  - Baseband Demodulator
  - Stereo Demodulator
- Complete Stereo Measurements:
  - \( L + R, L - R, \) Pilot, 38 kHz, \( L, R \)
  - SNR, Phase, AM Noise, Multipath
- Built-in Frequency-Synthesized Type Modulation Calibrator
- Exclusive Peak Modulation Duration Differentiator and Counter (P.M.D.D.™)
- Carrier & Pilot Frequency Measurement via front panel connector

GENERAL DESCRIPTION

To maximize your FM station's market coverage, TFT designed the Model 844 FM Stereo Modulation Monitor to help you reach all of your listeners—especially those in fringe areas with maximum allowable modulation levels.

The Model 844 can be used for off-air monitoring of modulation level or for direct transmitter Proof-of-Performance measurements. To accommodate all U.S. and International broadcast standards, the 844 Monitor features a two channel frequency-synthesized pre-selector having 50 kHz tunable steps.

For remote meter reading and peak flasher display, an optional panel with peak flashers and meters is available (see Options).

COMPLETE STEREO MEASUREMENTS

The 844 makes complete measurements of total modulation, Right channel modulation, Left channel modulation, channel separation, Main and Sub-channel crosstalk, \( L + R, L - R, \) 38 kHz carrier suppression and 19 kHz injection level. All measurements can be made with front panel push-buttons and are read on a large test meter.

COMPETITIVE MODULATION COMPARISON

Because the 844 is equipped with two digitally tunable RF pre-selectors, you can precisely select any one of two FM stations. This feature gives you a quick, easy way to check on how your modulation compares with other stations in your market.

PLL STEREO

The 844 provides superior stereo separation measurements. The phase-locked-loop (PLL) regenerates the 38 kHz carrier from the 19-kHz pilot carrier. This technique ensures precise accuracy and long-term stability of the phase relationship between the transmitter's pilot carrier and the regenerated 38 kHz subcarrier and therefore provides superior stereo demodulating characteristics. This also eliminates the need for phase adjustment during stereo measurements.
SIMULTANEOUS L & R MONITORING

Two separate meters permit simultaneous monitoring of Left and Right channel modulation. A third meter provides total modulation readings. The Left meter also acts as the Test Meter.

LOWEST T.H.D. & SNR

The 844 utilizes a pulse-counting FM discriminator to optimize frequency-to-voltage conversions. Consequently, the total harmonic distortion is less than 0.1% and the signal-to-noise ratio is better than 80 dB.

SCOPE OUTPUTS

BNC connectors are provided on the front panel to monitor the demodulated signals under test. The signals can be fed to external test equipment such as an oscilloscope. For example, the phase relationship of the Left and Right channels can be observed and/or adjusted with the use of these front panel connections.

FREQUENCY-SYNTHESIZED TYPE MODULATION CALIBRATOR

A frequency synthesized type FM modulation calibrator is built-in for calibration of the modulation meters and peak flashers. The highest stability and accuracy are achieved with crystal oscillators which remain stable well within the required accuracy regardless of temperature or age. No external equipment is required to use the modulation calibrator. Accuracy exceeds 1.0 percent, year after year. This feature eliminates the need for Bessell Null calibration.

I.F. BANDWIDTH SELECTION

The appropriate bandwidth is automatically selected when changing between off-air monitoring and on-site measurements. This feature eliminates bandwidth restrictions for Proof-of-Performance measurements.

ACCURATE PEAK DETECTION—P.M.D.D.™

The 844 includes the exclusive, Peak Modulation Duration Differentiator (P.M.D.D.). This feature is incorporated into a peak modulation detecting circuit to identify true modulation peaks and distinguish them from other peaks caused by transient noise, overshoot and multipath distortion. Only those peaks which exceed user-set values for modulation and duration will trigger the 844's P.M.D.D. peak flashers (simultaneous positive and negative modulation). A large LED display indicates the number of peaks per minute and is refreshed every sixty seconds.

ADJUSTABLE PEAK FLASHERS

Dual LED Peak Flashers may be adjusted over a broad range: 50% to 199% modulation. A thumbwheel-type switch eliminates the ambiguity and imprecision of potentiometer type controls.

BUILT-IN VOLTMETER & ATTENUATOR

For low-level modulation and noise measurements, a switchable 50 dB attenuator is built-in (10 dB steps). To perform a complete Proof, the only other equipment you need is a distortion analyzer and an audio generator.

DIRECT AM NOISE MEASUREMENTS

A convenient front panel switch allows you to use the 844 for direct measurement of incidental and residual AM on your transmitted carrier. The dynamic range of this measurement is 75 dB from 100% modulation.

SWITCHABLE DE-EMPHASIS

When measuring AM or low-level noise and modulation, a 75 μsec de-emphasis circuit can be easily switched into the meter circuit. Other time constants are available on request.

BUILT-IN MULTIPATH DETECTOR

When monitoring off-air, multipath can be read on the test meter so you can properly orient the monitor's receive antenna for maximum signal and minimum multipath interference.
**OPTIONS**

The Absence of Modulation Alarm is triggered when the composite signal drops below 30% modulation. Time is user-adjustable between 2 seconds and 1 minute.

The Carrier-Fail Alarm is triggered when the RF carrier drops below 50% of nominal.

TFT Part Number: 7100-3870.

**SPECIFICATIONS**

**RF SECTION**

- Frequency Range: 88-108 MHz, tunable in 50 kHz steps
- High Level Transmitter RF input voltage: 1 to 10 volts RMS
- Antenna input voltage & impedance: 250 μV to 100 mV, 75 ohms, BNC
- Tuning: Two 4-digit thumbwheel switches and a pushbutton switch for selecting station A or station B.
- AGC range: 60 dB
- Composite Input: 3.5 V P-P; 1.0 k ohms potentiometer, BNC.

**MODULATION METER, TOTAL**

- Deviation for 100% indication: ± 75 kHz, peak-to-peak.
- Meter Range: 0 to 133% modulation.
- AC voltmeter range: 0 to −50 dB in 10 dB steps.
- Accuracy (5 kHz tone): ± 0.2% at all modulation levels.
- Frequency Response: ± 0.1 dB typical, from 50 Hz to 75 kHz; ± 0.5 dB max from 30 Hz to 120 kHz.

**MODULATION METER, RIGHT**

- Right channel modulation: Indicates and measures right channel modulation.
- Frequency Response: ± 0.25 dB, 50 Hz to 15 kHz.
MODULATION METER, LEFT/TEST

Left channel modulation Indicates and measures left channel modulation.
Right channel modulation Same as right modulation meter.
Total Modulation Same as total modulation meter.
L + R ± 0.25 dB, 50 Hz to 15 kHz
L - R ± 0.35 dB, 23 kHz to 53 kHz
Pilot Level & 38 kHz level Measures down to ~ 60 dB.
Phase Calibration For optimization of stereo measurements.
AM Noise Measures transmitter AM noise down to ~ 75 dB from 100% modulation.
Multipath indicator For adjustment of antenna to minimize multipath distortion.

PEAK MODULATION INDICATORS
Deviations for 100% indication ± 75 kHz
Peak Level Set by a front panel 3-digit thumbwheel switch in 1% steps from 50% to 199% on both positive and negative peaks.
Accuracy (5 kHz tone) ± 1% at 100% modulation
Frequency Response ± 2% from 30 Hz to 120 kHz.
Response Time Accuracy Adjustable, 10 cycles of 10 kHz or faster.
Peak Counter Registers number of true peaks of modulation per minute.

MODULATION CALIBRATOR
Built-in frequency synthesized calibrator for meter and peak flasher calibration of 100% modulation (± 75 kHz) from the front panel. Accuracy, ± 0.5%.

OUTPUTS, FRONT & REAR PANEL
Main channel output with 75 µsec de-emphasis 5 volts RMS into 5K ohms at 400 Hz.
*Signal-to-Noise Ratio 78 dB at 400 Hz with de-emphasis.
*Harmonic Distortion 0.1% max (de-emphasized).
*Intermodulation Distortion 0.1% max per SMPTE standard.

Balanced audio output level 0 dBm into 600 ohms.
*Balanced audio Frequency Response ± 0.5 dB from 30 Hz to 120 kHz.
Composite output for SCA Monitor 1 volt RMS into 600 ohms.
Pilot carrier (19 kHz) 600 mV RMS, available on front panel.
Composite 5 VRMS, 10k ohms at 100% modulation.
Connectors BNC
Meter output Main meter selected signal available on front panel.
Carrier-fail Alarm (option) Relay drive output capable of sinking 50 mA at 30 VDC when RF carrier drops below 50% of nominal.
Absence of Modulation Alarm (option) An output capable of sinking 50 mA at 30 VDC when composite signal drops below 30% modulation for a period of time between 2 seconds and 1 minute, internally adjustable.

STEREO SEPARATION AND CROSSTALK
Separation: L to R & R to L 60 dB typical, 55 dB minimum, 50 Hz to 15 kHz.
Crosstalk:
\[(L + R) \text{ to } (L - R) \text{ or, } (L - R) \text{ to } (L + R)\] 65 dB minimum.
Crosstalk:
SCA to (L + R) or, SCA to (L - R) 70 dB minimum.
Pilot carrier measurement level accuracy ± 0.5% from 6% to 12% injection.

MECHANICAL AND ENVIRONMENTAL
Input power 115/230 VAC, ± 10%, 50 to 400 Hz, 40 watts maximum.
Operating Temperature 0°C to 50°C (32°F to 122°F).
Size and Net weight 19" (48.26 cm) Wide × 7" (17.78 cm) High × 15" (38.10 cm) Deep; 18.5 lbs. (8.4 kg) net.

Contents subject to change without notice.
DIGITAL TELEMTRY CONTROL & STATUS MONITORING

FEATURES

- Modular, field-expandable design.
- Fully digital, built-in FSK modems.
- Links can be established by Telco, wire line, subcarrier, TSL, or SCA.
- Convenient, one person system calibration.
- 10 channels each for RAISE, LOWER, TELEMTRY & STATUS.
- Built-in relay interface—no external relay panels needed!
- Complete line of transmitter interfacing accessories.

GENERAL DESCRIPTION

The TFT 8610 System permits any size AM, FM and TV station or other facility to have direct digital control of remote transmitters and facilities. Designed to meet today’s growing needs, the system is totally modular for tailoring it to your own specific control and budget requirements.

Start with an economical and easy-to-operate stand-alone system with 10 channels each of RAISE, LOWER, TELEMETRY and STATUS. When required, add up to 60 more channels of RAISE/LOWER in increments of 20 channels and an additional 32 channels of STATUS monitoring. The system’s telemetry and status channels may be easily field expanded to meet the needs of even the largest stations.

CHOICE OF INTERCONNECT METHODS

Interconnection can be made with telephone lines and/or radio links. Radio links include: STL subcarriers, FM SCA or dedicated TSL.

MAXIMUM DATA INTEGRITY

Data accuracy and error-free operations are ensured by TFT proprietary digital data filtering and closed-loop automatic verification systems. With digital data filtering, each control command is sent twice. The two commands are then compared at the remote point, bit by bit. Only if the two commands match exactly will the commands be initiated. A closed feedback scheme automatically verifies the selection of the interrogated channel.

Frequency Shift Keying (FSK) is employed for data transmission and digital data modems are included.

ONE PERSON CALIBRATION

The Model 8611 (transmitter site—remote point) has a front panel DVM and scaling potentiometers so that one person can calibrate the system on-site without assistance from the studio (control point). For local operations, a switch will lock out the studio and override the telemetry and control failsafes. The Model 8631 Channel Expander contains its own set of scaling potentiometers, but utilizes the DVM in the 8611. The Model 8633 Status Expander contains its own set of tally LED's to verify operation.

OPERATION

Individual channels on the Model 8610 are selected by using a thumbwheel switch. Once selected, the channel number is fed back from the Model 8611 and displayed on the front panel of the Model 8610 for verification. The system then addresses this channel and displays the telemetry data on a front panel 3½” digit DVM. The readings are updated 3 times per second. (continued)
Control commands are initiated by pushing either the RAISE/ON or LOWER/OFF switches on the front panel of the 8610. This activates built-in momentary relays in the 8611. When a command is activated at the control point, a signal is fed back from the remote point. This signal verifies receipt of the command by illuminating the LED associated with the switch that was depressed.

Failsafe indicators on the front panels of both units give indications of up-link and down-link integrity for quick troubleshooting of problems.

**SYSTEM COMPONENTS**

The Models 8610 and 8611 are the basic building blocks of the versatile 8610 System. The Model 8610 resides at the studio (control point) and the Model 8611 is installed at the transmitter site (remote point). Although it is a fully stand-alone, 10 channel digital system with RAISE/LOWER functions and 10 channels of TELEMETRY and STATUS, it can be field-expanded to meet the needs of even the largest station by adding the Models 8631 Channel Expander and 8632/8633 Status/Alarm to increase the number of telemetry and status channels (described below).

**LOCATIONS**

Model 8610—Studio site (control point)
Model 8611—Transmitter site (remote point)
Model 8631—Channel expander: transmitter site (remote point)
Model 8632—Status expander: studio site (control point)
Model 8633—Status expander: transmitter site (remote point)
MODEL 8632/33 STATUS/ALARM

The 8632 and 8633 provide 32 additional channels of status and alarm to the 8610 system. This expanded system provides a maximum of 42 channels of STATUS/ALARM. Only one 8632/33 pair can be added.

MODEL 8631—CHANNEL EXPANDER

The Model 8631, when added to the 8611, expands the RAISE/LOWER and TELEMETRY functions of the system from 10 to 30 channels. A single 8610 accommodates as many as three Model 8631’s for a maximum system capacity of 70 RAISE/LOWER and TELEMETRY functions.

ORDERING INFORMATION
Model 8610/8611 (specify method of uplink and downlink)
Model 8631 Channel Expander
Model 8632/33 Status Expander

OPTIONS: MODEL 8610/11
Option 01—Subcarrier Decoder for operation in RF link (specify subcarrier frequency)
Option 02—Subcarrier Generator for operation in RF link (specify subcarrier frequency)
Option 03—Generator/Decoder on same assembly for bidirectional RF links. (specify subcarrier frequencies)
Option 07—Spare Parts Kit (TFT P/N 7100-4136)

OPTIONS: MODEL 8632/8633
Option 01—Spare Parts Kit (TFT P/N 7100-4138)

ACCESSORIES
A full line of accessories for interfacing with transmitters and transmitting site facilities are available. Please refer to the Remote Control Accessories Data Sheet.
Stepping relays or latching relays can be used for ON/OFF control functions. Complete system configurations are available for both Telco and RF links or any combination thereof. These systems can be specifically tailored for your particular needs.

STUDIO
8632 Status/Alarm
SCA MONITOR
FM MONITOR

8610 Control Terminal
MODDEM
DET GEN

TYPICAL SYSTEMS BLOCK DIAGRAM
TSL Rx
TSL Tx
STL Tx
STL Rx

TRANSMITTER
8633 Status/Alarm
8631 Channel Expander
8631 Channel Expander
8631 Channel Expander
MAIN Tx
### Communication Systems

- **Telephone Line**: Two-wire unconditioned, Series 3002 Data circuit.
- **Audio Channel**: Any voice-grade channel having a bandwidth of 300 Hz to 3 kHz. Maximum attenuation of -30 dB. Example: TSL or hard-wire.
- **Radio (STL)**: Plug-in FM subcarrier modulator and demodulator for command link.
- **Radio (off-air)**: SCA frequencies (Consult Factory).
- **SCA/Subcarrier Modulator Output**: Adjustable 0-800 mV rms.
- **SCA/Subcarrier Demodulator Input Range**: 20 mV to 700 mV rms.

### Telemetry

**Accuracy**
- 0.1% of reading, ± 1 count

**Update**
- Three updates per second

**Analog Input Voltage**
- ± 10 VDC Maximum input to rear panel telemetry input.
- ± 4 VDC maximum input to internal A/D converter.
- ± 3400 maximum count on DVM display.

**Input Common-Mode Voltage**
- ± 350 VDC

**Input Impedance**
- 50 kilohms

**Input Isolation**
- Optically isolated

### Control Outputs

- **8611 and 8631** (up/down-on/off; rear barrier strip): Isolated, contact closure relay. AC/DC rated, non-inductive load; 1A at 115 VAC or 2A at 26 VDC.

### Data Transmission

- Digital pulse-code-modulated FSK modems; 800-baud control, 300 baud telemetry.

### Communication Link Requirements

### Fail Safe Provisions

#### 8610: Uplink Control Failure
- Front panel red LED indicator — no relay closures available.

#### Downlink Telemetry Failure
- After a 10 second delay, a Telemetry Fail output on the rear panel is activated (+ 5V TTL), and a front panel LED is illuminated.

#### 8611: Uplink Control Failure
- Normally-closed relay contacts rated (non-inductive load) for .5 A at 115 VAC or 1A at 26 VDC. Adjustable delay of approximately 20-55 seconds. LED indicator on Front Panel.

#### Downlink Telemetry Failure
- 10 second nominal delay. Output for driving external one-hour timer and TV fail-safe units for full compliance with FCC Rule 73.676. LED indicator on Front Panel.

### Local Mode Indication (8611 Rear Panel)
- Relay contact closure for external alarm device. Contacts rated (non-inductive load) for 0.5A at 115 VAC or 1A at 26 VDC.

### Power Required

- **Model 8610**: 115 VAC/220 VAC ± 10%, 50 to 400 Hz, 15 watts maximum.
- **Model 8611**: 115 VAC/220 VAC ± 10%, 50 to 400 Hz, 25 watts maximum.
- **Model 8631**: From Model 8611.
- **Model 8632**: 115 VAC/220 VAC ± 10%, 50 to 400 Hz, 15 watts maximum.
- **Model 8633**: 115 VAC/220 VAC ± 10%, 50 to 400 Hz, 15 watts maximum.

### Operating Temperature
- 0° to 50° C

### Humidity
- to 95% non-condensing

### Mounting
- 19 inch rack

### Dimensions and Net Weights

- **Model 8610**: 5¼" x 19" W x 13" D, 12 lbs.
- **Model 8611**: 5¼" x 19" W x 13" D, 16 lbs.
- **Model 8631**: 5¼" x 19" W x 13" D, 6 lbs.
- **Model 8632 & 8633**: 3½" x 19" W x 15" D, 10 lbs.

*Contents subject to change without notice.*
DOMESTIC PRICE LIST
STL SYSTEMS
SELECTION TABLE
OPTIONS & ACCESSORIES

TSL SYSTEMS
# STL SYSTEMS

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<th>MODEL</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>SUGGESTED LIST PRICE (U.S. Dollars)</th>
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<tr>
<td>8300</td>
<td>5116-8300</td>
<td>All solid state composite transmitter including self-contained power supply and tested to customer specified operating frequency.</td>
<td><strong>$ 4,550.00</strong></td>
</tr>
<tr>
<td>8301</td>
<td>5116-8301</td>
<td>All solid state composite receiver including self-contained power supply and tested to customer specified operating frequency.</td>
<td><strong>$ 4,400.00</strong></td>
</tr>
<tr>
<td>8301B</td>
<td>5116-8301B</td>
<td>All solid state narrow band (250 kHz) composite receiver including self-contained power supply and tested to customer specified operating frequency.</td>
<td><strong>$ 4,400.00</strong></td>
</tr>
<tr>
<td>7700B</td>
<td>5116-7700B</td>
<td>All solid state transmitter including self-contained power supply and tested to customer specified operating frequency. For composite or monaural use.</td>
<td><strong>$ 3,850.00</strong></td>
</tr>
<tr>
<td>7707</td>
<td>5116-7707</td>
<td>All solid state composite receiver including self-contained power supply and tested to customer specified operating frequency.</td>
<td><strong>$ 3,145.00</strong></td>
</tr>
<tr>
<td>7705</td>
<td>5116-7705</td>
<td>All solid state monaural receiver including self-contained power supply and tested to customer specified operating frequency.</td>
<td><strong>$ 3,395.00</strong></td>
</tr>
<tr>
<td>8600</td>
<td>5116-8600</td>
<td>All solid state monaural transmitter including 39 kHz SCA generator, self-contained power supply and tested to customer specified operating frequency.</td>
<td><strong>$ 1,600.00</strong></td>
</tr>
<tr>
<td>8601</td>
<td>5116-8601</td>
<td>All solid state monaural receiver including 39 kHz SCA detector, self-contained power supply and tested to customer specified operating frequency.</td>
<td><strong>$ 1,595.00</strong></td>
</tr>
<tr>
<td>7770</td>
<td>5116-7770</td>
<td>Automatic Transmitter Changeover Unit, for hot-standby use. Use with two STL transmitters. Contains coaxial changeover relay; power combiner not required. Self-contained power supply.</td>
<td><strong>$ 960.00</strong></td>
</tr>
<tr>
<td>7773</td>
<td>5116-7773</td>
<td>Automatic Receiver Changeover Unit, for hot-standby use with two STL receivers; built-in power splitter. Unit derives DC power from STL receivers.</td>
<td><strong>$ 900.00</strong></td>
</tr>
</tbody>
</table>

## STL OPTIONS

<table>
<thead>
<tr>
<th>Option</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 01</td>
<td>7100-3780</td>
<td>Spare Parts Kit for 8300 Series.</td>
<td><strong>$ 565.00</strong></td>
</tr>
<tr>
<td>Option 04</td>
<td>7100-3500</td>
<td>Spare Parts Kit for 7700B Series.</td>
<td><strong>$ 375.00</strong></td>
</tr>
<tr>
<td>Option 05</td>
<td>7100-4135</td>
<td>Spare Parts Kit for 8600 Series.</td>
<td><strong>$ 310.00</strong></td>
</tr>
<tr>
<td>Option 06</td>
<td>7100-3770</td>
<td>Non-standard frequency for STL or TSL. (Specify exact frequency desired). For transmitter/ receiver pair. Consult T/T if in doubt.</td>
<td><strong>$ 335.00</strong></td>
</tr>
<tr>
<td>Option 15</td>
<td>7100-3710</td>
<td>Stereo decoder module, for composite receivers.</td>
<td><strong>$ 225.00</strong></td>
</tr>
<tr>
<td>Option 16</td>
<td>7100-3790</td>
<td>Extended Baseband Response, permits Composite STL to convey 92 kHz SCA channel.</td>
<td><strong>$ 415.00</strong></td>
</tr>
<tr>
<td>Option 20</td>
<td>7100-3640</td>
<td>Narrow Band IF for 7705 monaural receiver. Total carrier frequency deviation ±25.5 kHz.</td>
<td><strong>$ 365.00</strong></td>
</tr>
<tr>
<td>Option 21</td>
<td>7100-3650</td>
<td>Narrow Band IF for 7705 monaural receiver. Total carrier frequency deviation ±11.5 kHz.</td>
<td><strong>$ 365.00</strong></td>
</tr>
<tr>
<td>Option 22</td>
<td>7100-4070</td>
<td>IF Repeater (63 MHz) circuits installed in 8300/8301 STL. One (1) required for each intermediate site. Specify operating frequency for each path segment (hop). 12 Volts option for 8600 / 8601. (price per unit)</td>
<td><strong>$ 1,200.00</strong></td>
</tr>
<tr>
<td>Option 23</td>
<td>7100-4148</td>
<td>12 Volts option for 8600 / 8601. (price per unit)</td>
<td><strong>$ 75.00</strong></td>
</tr>
</tbody>
</table>

## STL ACCESSORIES

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>SCA-1</td>
<td>5116-SCA1</td>
<td>Standalone Subcarrier Generator for data transmission (specify operating frequency).</td>
<td><strong>$ 840.00</strong></td>
</tr>
<tr>
<td>SCA-2</td>
<td>5116-SCA2</td>
<td>Standalone Subcarrier Detector for data reception (specify operating frequency).</td>
<td><strong>$ 840.00</strong></td>
</tr>
<tr>
<td>SCA-3</td>
<td>5116-SCA3</td>
<td>Standalone Subcarrier Generator and Detector for data transmission and reception (specify two operating frequencies).</td>
<td><strong>$ 1,100.00</strong></td>
</tr>
<tr>
<td>COMBINER</td>
<td>7100-4145</td>
<td>Combines 2 transmitter outputs to one antenna. (80 dB isolation). Specify two operating frequencies.</td>
<td><strong>$ 1,565.00</strong></td>
</tr>
<tr>
<td>SPLITTER</td>
<td>3500-0021</td>
<td>2-way power splitter for 2 receivers using one antenna.</td>
<td><strong>$ 115.00</strong></td>
</tr>
</tbody>
</table>

* Not field installable
### STL Systems Product Selection Table

<table>
<thead>
<tr>
<th>SYSTEM DESIGNATION</th>
<th>Composite Systems</th>
<th>Discrete Systems (Monaural)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With Hot-Standby</td>
<td>With Hot-Standby</td>
</tr>
<tr>
<td>Components</td>
<td>8300C 7700C</td>
<td>8300CH 7700CH 7700M 8600M 7700M 8600MH</td>
</tr>
<tr>
<td>8300 Composite</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(5116-8300)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7700B Discrete or Composite</td>
<td>1 2</td>
<td>1 2</td>
</tr>
<tr>
<td>(5116-7700B)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8600 Discrete</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(5116-8600)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8301 Composite</td>
<td>1*</td>
<td>2*</td>
</tr>
<tr>
<td>(5116-8301)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7707 Composite</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(5116-7707)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7705 Discrete</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(5116-7705)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8601 Discrete</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>(5116-8601)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transmitter Change-Over, 7770</td>
<td>1 1</td>
<td>1 1</td>
</tr>
<tr>
<td>(5116-7770)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Receiver Change-Over, 7773</td>
<td>1 1</td>
<td>1 1</td>
</tr>
<tr>
<td>(5116-7773)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SYSTEM TOTALS</td>
<td>$8,950</td>
<td>$6,995</td>
</tr>
<tr>
<td></td>
<td>$19,760</td>
<td>$15,850</td>
</tr>
<tr>
<td></td>
<td>$7,245</td>
<td>$3,195</td>
</tr>
<tr>
<td></td>
<td>$16,350</td>
<td>$8,250</td>
</tr>
</tbody>
</table>

* ALSO AVAILABLE: 8301B NARROWBAND RECEIVER, (5116-8301B). SUCH SYSTEMS DESIGNATED 8300CN OR 8300CHN.

**Key:**
- C = Composite
- M = Mono
- H = Hot Standby
- N = Narrowband

### SYSTEM DESCRIPTIONS

**HOT-STANDBY SYSTEM** consists of two Transmitters, one Transmitter Automatic Changeover Unit, two Receivers and one Receiver Changeover Unit. Transmitter Automatic Changeover Unit has built-in coaxial changeover relay; therefore, combiners are not necessary to interface two transmitters (one on hot-standby) to one antenna. Receiver Automatic Changeover Unit has built-in power combiner for interfacing with two receivers (one on hot-standby).

**DUAL MONOAURAL SYSTEMS:** The 8600 series STL is ideal for dual monaural applications (discrete stereo). Separation between operating frequencies should be at least 125 kHz.

For dual transmit/dual receive system using one antenna each at studio and broadcast transmitter sites, an STL transmitter combiner and receiver splitter are necessary, and must be ordered separately. See STL accessories section.

**MULTI-HOP SYSTEMS:** Any of the systems shown in the table can be used for conventional multi-hop STL links.

**IF REPEATER:** 8300 Transmitter and 8301 (or 8301B) Receiver can be used as a unique IF Repeater combination. Order Option 22 for each 8301 receiver and 8300 transmitter combination used at all intermediate sites.

**OTHER SYSTEMS:** TFT and your dealer can assist you with almost any conceivable variation of STL equipment, options, and accessories as well as custom work, to meet your STL needs. Please contact your dealer or TFT with your requirements.
### STL/TSL ANTENNAS, COAXIAL TRANSMISSION LINE AND CONNECTOR KITS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>P972GRN-M1</td>
<td>3500-0016</td>
<td>ANIXTER-MARK Grid Parabolic Antenna, six-foot diameter, for 890-960 MHz, type N female connector, 50 ohm (1.3:1 VSWR standard) special order, non-pressurized feed, vertical horizontal polarization for mounting to 1.5 to 3.5 inch O.D. pipe. (Other mounts on special order). Gain 22.0 dBI mid-band.</td>
<td>**</td>
</tr>
<tr>
<td>PR-450U</td>
<td>3500-0001</td>
<td>SCALA Parallactor &lt;TM&gt;, Parabolic Antenna, for 350-1000 MHz, type N female connector, 50 ohm, universal mounting for vertical or horizontal polarization, gain 20.1 dBi at 950 MHz; 16.6 dBi at 450 MHz.</td>
<td>**</td>
</tr>
<tr>
<td>SH872GN</td>
<td>3500-0017</td>
<td>ANIXTER-MARK Multi-element Grid Parabolic Section Antenna (72&quot; x 36&quot;), for 675-960 MHz, type N female connector, 50 ohm, vertical or horizontal polarization, for mounting on up to 3.5 inch O.D. pipe, Gain 19.6 dBi at 950 MHz.</td>
<td>**</td>
</tr>
<tr>
<td>MF960</td>
<td>3500-0002</td>
<td>SCALA Minilselector &lt;TM&gt; Antenna for 940-960 MHz, 16.1 dBi gain, type N female connector, university mounting for vertical or horizontal polarization, fully anodized. (Not recommended for congested areas.</td>
<td>**</td>
</tr>
<tr>
<td>MG-944GN</td>
<td>3500-0018</td>
<td>ANIXTER-MARK Mini Grid Parabolic Section Antenna (44&quot; x 13.5&quot;), for 890-960 MHz, type N female connector, 50 ohm vertical or horizontal polarization, for mounting on up to 3.5 inch O.D. pipe. Gain 13.5 dBi at 950 MHz.</td>
<td>**</td>
</tr>
<tr>
<td>LDF4-50</td>
<td>3500-0003</td>
<td>ANDREW Heliax LDF4-50 Transmission Line : 1/2&quot; foam Dielectric, 50 ohm, jacketed.</td>
<td>**</td>
</tr>
<tr>
<td>L44N</td>
<td>3500-0004</td>
<td>Andrew L44N type N female connector for LDF4-50 ANDREW Heliax. Order two (2) for both ends of transmission line. Two (2) PTL-1 or equivalent needed for normal installation.</td>
<td>**</td>
</tr>
<tr>
<td>LDF5-50</td>
<td>3500-0005</td>
<td>ANDREW Heliax LDF5-50 Transmission Line : 7/8&quot; foam Dielectric, 50 ohm, jacketed. Specify length.</td>
<td>**</td>
</tr>
<tr>
<td>L45N</td>
<td>3500-0006</td>
<td>ANDREW L45N type N female connector for LDF5-50 ANDREW Heliax. Order two (2) for both ends of transmission line. Two (2) PTL-1 or equivalent needed for normal installation. Specify length for strain relief on either end of transmission line.</td>
<td>**</td>
</tr>
<tr>
<td>PTL-1</td>
<td>4750-0208</td>
<td>Permit installation of STL/TSL antennas on AM tower. 950-450/150 MHz band. MF: Kinorvic Labs (Specify frequency). SCALA CAS-450 5-element Yagi for 10dB gain (cut to frequency). Specify frequency (216-1000 MHz)</td>
<td>**</td>
</tr>
<tr>
<td>ISOCOUPLER</td>
<td>3500-0008</td>
<td>SCALA CAT-460 7-element Yagi for 10dB gain (broadband). Specify 450-470 MHz or 406-420 MHz</td>
<td>**</td>
</tr>
<tr>
<td>CAS-450</td>
<td>3500-0009</td>
<td>CAS-450 5-element Yagi for 10dB gain (cut to frequency). Specify frequency (216-1000 MHz)</td>
<td>**</td>
</tr>
<tr>
<td>CA7-460</td>
<td>3500-0010</td>
<td>CAS-460 7-element Yagi for 10dB gain (broadband). Specify 450-470 MHz or 406-420 MHz</td>
<td>**</td>
</tr>
</tbody>
</table>

WE RESERVED THE RIGHT TO SUBSTITUTE NON-PROPRIETARY ITEMS WITH OTHER MANUFACTURERS' EQUIVALENT.

**Contact TFT for latest prices.**

### 450 MHZ TRANSMITTER-STUDIO LINK

Model 8100/8101 Telemetry Return Link. One (1) system consists of one (1) 8100 and one (1) 8101.

<table>
<thead>
<tr>
<th>MODEL</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL 8100</td>
<td>5116-8100</td>
<td>450 MHz Transmitter-Studio Voice/Data Link. Specify FCC Group P frequency.</td>
<td>$2,035.00</td>
</tr>
<tr>
<td>MODEL 8101</td>
<td>5116-8101</td>
<td>450 MHz Receiver-Studio Voice/Data Link. Specify FCC Group P frequency.</td>
<td>$2,035.00</td>
</tr>
<tr>
<td>Option 01</td>
<td>7100-3460</td>
<td>Automatic ID (Specify ID code)</td>
<td>$320.00</td>
</tr>
</tbody>
</table>

NOTE: For non-standard frequencies, contact TFT.

### TERMS OF SALE

All shipments are made F.O.B. Santa Clara, California. Terms are net 30 days to customers who have a satisfactory established line of credit with us. Others should arrange with the factory for payment at the time of shipment.

**WARRANTY**

TFT, Inc. warrants each of the instruments of its manufacture to be produced to meet the specifications delivered to the BUYER; and to be free from defects in material and workmanship; and will repair or replace at its expense, for a period of one year (STL’s: 2 years) from the date of delivery of equipment, any parts which are defective from faulty material or workmanship. Equipment, accessories, tubes and batteries not manufactured by TFT are subject to only such warranties as those listed by the manufacturer. Instruments found to be defective during the warranty period shall be returned to the factory with transportation charge prepaid by the BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER, prior to such returns. Upon examination by the factory, if the instrument is found to be defective, the unit will be repaired and returned to the BUYER, with transportation charge prepaid by SELLER. Transportation charges for instruments found to be defective within the first thirty (30) days of warranty period will be paid both ways by the SELLER. Transportation charges for warranty returns and repair costs, wherein failure is found not to be the fault of the SELLER, shall be paid both ways by the BUYER. This warranty does not apply to instruments which, in the opinion of the SELLER, have been altered or misused. No other warranty is expressed or implied. SELLER SPECIFICALLY EXCLUDES AND DISCLAIMS ANY WARRANTY FOR FITNESS OR PURPOSE AND MERCHANTABILITY. IN NO EVENT SHALL SELLER BE RESPONSIBLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES.

### CONTENTS SUBJECT TO CHANGE WITHOUT NOTICE
## FM Products

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Suggested List Price (U.S. Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL 844 (5116-0844)</td>
<td>FM BASEBAND/STEREO MODULATION MONITOR (Specify frequency for high level monitoring.) (75 usec de-emphasis supplied standard.)</td>
<td>$4,250.00</td>
</tr>
<tr>
<td>Option 01 (7100-3870)</td>
<td>Absence of Modulation/Carrier Fail Alarm</td>
<td>$275.00</td>
</tr>
<tr>
<td>Option 02 (7100-3890)</td>
<td>Spare Parts Kit</td>
<td>$475.00</td>
</tr>
<tr>
<td>MODEL 804 (5116-0804)</td>
<td>REMOTE METER AND PEAK FLASHER PANEL FOR MODEL 844</td>
<td>$525.00</td>
</tr>
<tr>
<td>MODEL 845 (5116-0845)</td>
<td>3-CHANNEL SCA MODULATION MONITOR, 67 kHz supplied standard</td>
<td>$2,265.00</td>
</tr>
<tr>
<td>Option 01 (7100-3880)</td>
<td>RF Module-Preselector (Specify frequency)</td>
<td>$710.00</td>
</tr>
<tr>
<td>Option 02 (7100-3900)</td>
<td>SCA Channel (41 kHz)</td>
<td>$235.00</td>
</tr>
<tr>
<td>Option 03 (7100-3910)</td>
<td>SCA Channel (92 kHz)</td>
<td>$235.00</td>
</tr>
<tr>
<td>Option 04 (7100-3920)</td>
<td>Spare Parts Kit</td>
<td>$230.00</td>
</tr>
<tr>
<td>MODEL 805 (5116-0805)</td>
<td>REMOTE METER AND PEAK FLASHER PANEL FOR MODEL 845</td>
<td>$495.00</td>
</tr>
</tbody>
</table>

## AM Products

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Suggested List Price (U.S. Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL 753 (5116-0753)</td>
<td>AM MODULATION MONITOR</td>
<td>$1,525.00</td>
</tr>
<tr>
<td>Option 02 (7100-2440)</td>
<td>Carrier Power Alarm</td>
<td>$90.00</td>
</tr>
<tr>
<td>Option 03 (7100-2410)</td>
<td>10 KHz Whistle Filter</td>
<td>$340.00</td>
</tr>
<tr>
<td>Option 04 (7100-2420)</td>
<td>30 Hz Telemetry Lowpass Filter</td>
<td>$260.00</td>
</tr>
<tr>
<td>Option 05 (7100-2430)</td>
<td>Absence of Modulation Alarm</td>
<td>$290.00</td>
</tr>
<tr>
<td>Option 06 (7100-2460)</td>
<td>230 VAC</td>
<td>$60.00</td>
</tr>
<tr>
<td>Option 07 (7100-2560)</td>
<td>Spare Parts Kit</td>
<td>$225.00</td>
</tr>
<tr>
<td>MODEL 755A (5116-0755A)</td>
<td>AM RF PRESELECTOR (TUNABLE IN 1kHz INCREMENTS)</td>
<td>$1,610.00</td>
</tr>
<tr>
<td>Option 01 (7100-2470)</td>
<td>Narrow Band Filter</td>
<td>$485.00</td>
</tr>
<tr>
<td>Option 04 (7100-2500)</td>
<td>Spare Parts Kit</td>
<td>$290.00</td>
</tr>
<tr>
<td>MODEL 704E (5116-704E)</td>
<td>REMOTE METER AND PEAK FLASHER PANEL FOR MODEL 753</td>
<td>$495.00</td>
</tr>
</tbody>
</table>

* Not field installable
# RADIO MONITORING EQUIPMENT

## EBS PRODUCTS

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL 760-1A</td>
<td>TUNABLE AM RECEIVER/ENCODER/DECODER</td>
<td>$1,420.00</td>
</tr>
<tr>
<td>MODEL 760-1B</td>
<td>SINGLE CHANNEL FM RECEIVER/ENCODER/DECODER</td>
<td>$1,420.00</td>
</tr>
<tr>
<td></td>
<td>Specify one receive frequency</td>
<td></td>
</tr>
<tr>
<td>MODEL 760-1C</td>
<td>DUAL CHANNEL FM RECEIVER/ENCODER/DECODER</td>
<td>$1,675.00</td>
</tr>
<tr>
<td></td>
<td>Specify two receive frequencies</td>
<td></td>
</tr>
<tr>
<td>MODEL 8010</td>
<td>FM E-ALERT RECEIVER, Specify frequency</td>
<td>$275.00</td>
</tr>
<tr>
<td>MODEL 8020</td>
<td>AM E-ALERT RECEIVER, Specify frequency</td>
<td>$275.00</td>
</tr>
</tbody>
</table>

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## WARRANTY

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Instruments found to be defective during the warranty period shall be returned to the factory with transportation charge prepaid by the BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of the BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER, prior to such returns. Upon examination by the factory, if the instrument is found to be defective, the unit will be repaired and returned to the BUYER, with transportation charge prepaid by the SELLER.

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## CONTENTS SUBJECT TO CHANGE WITHOUT NOTICE
## DOMESTIC PRICE LIST

**REMOTE CONTROL EQUIPMENT**

**Effective**

2 MAR 87

<table>
<thead>
<tr>
<th>MODEL/DESCRIPTION</th>
<th>APPLICATION</th>
<th>Suggested List Price (U.S. Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL 8610/8611:</strong> 10 Channel RAISE/LOWER Plus 10 Channel TELEMETRY and STATUS digital remote control system. Expandable by adding Models 8631, 8632/33, to a 112 channel system. To provide digital remote control systems for AM, FM &amp; medium size TV stations. Minimum system comprises one (1) 8610 and one (1) 8611.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MODEL 8610 (5116-8610)</td>
<td>Control portion only of 8610/8611 system</td>
<td>$1,650.00</td>
</tr>
<tr>
<td>MODEL 8611 (5116-8611)</td>
<td>Remote portion only of 8610/8611 system</td>
<td>$2,150.00</td>
</tr>
<tr>
<td>Option 01 (7100-2610) Sub-carrier (SCA) Detector. Frequencies from 26 kHz to 185 kHz available. Mounts within 8610 or 8611.</td>
<td>To provide demodulation of the SCA subcarrier (Specify frequency and whether for uplink or downlink.)</td>
<td>$280.00</td>
</tr>
<tr>
<td>Option 02 (7100-2620) Sub-carrier (SCA) Generator. Frequencies from 26 kHz to 185 kHz available. Mounts within 8610 or 8611.</td>
<td>To generate the SCA subcarrier (Specify frequency and whether for uplink or downlink.)</td>
<td>$280.00</td>
</tr>
<tr>
<td>Option 03 (7100-2600) SCA Generator/Detector in one module.</td>
<td>Single module combines functions of Option 01 &amp; 02 (Specify frequencies and whether for uplink or downlink.)</td>
<td>$610.00</td>
</tr>
<tr>
<td>Option 07 (7100-4136) Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.'s and other critical components for emergency repairs</td>
<td>$475.00</td>
</tr>
<tr>
<td><strong>MODEL 8631 (5116-8631) Channel Expander (20 channels)</strong></td>
<td>To expand the RAISE/LOWER and TELEMETRY channels of the Model 8610/8611 by 20 additional channels. (to be installed at the Remote Terminal only) Up to 3 Model 8631's can be added (for 70 channels, total).</td>
<td>$1,690.00</td>
</tr>
<tr>
<td>Option 01 (7100-4137) Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.'s and other critical components for emergency repair.</td>
<td>$240.00</td>
</tr>
<tr>
<td><strong>MODEL 8632/8633</strong> 32 Channel Status/Alarm Expander. Provides an additional 32 channels of STATUS/ALARM to 8610/8611 system, for a total of 42 channels.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MODEL 8632 (5116-8632)</strong></td>
<td>Control portion only of 8632/8633 system (One 8633 is also required for full operation)</td>
<td>$1,375.00</td>
</tr>
<tr>
<td><strong>MODEL 8633 (5116-8633)</strong></td>
<td>Remote portion only of 8632/8633 system (One 8632 is also required for full operation)</td>
<td>$1,455.00</td>
</tr>
<tr>
<td>Option 01 (7100-4138) Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.'s, and other critical components for emergency repair.</td>
<td>$390.00</td>
</tr>
</tbody>
</table>
**MODEL 7815 (STANDALONE UNIT)** Status and Control System with 15 ON/OFF control and 15 STATUS indication channels, consisting of a Control and Remote unit. For ON/OFF control and STATUS indications only. Expandable to 47 channels of status by the addition of 8632 and 8633.

<table>
<thead>
<tr>
<th>MODEL/DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL 7815-C</strong></td>
<td>Control portion of 7815 system (One 7815-R is also required for full operation)</td>
<td>$1,860.00</td>
</tr>
<tr>
<td>(5116-7815)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MODEL 7815-R</strong></td>
<td>Remote portion of 7815 system (One 7815-C is also required for full operation)</td>
<td>$2,155.00</td>
</tr>
<tr>
<td>(5116-7816)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 02</td>
<td>Spare Parts Kit. To provide spare parts such as relays, I.C.'s and other critical components for emergency repair.</td>
<td>$455.00</td>
</tr>
<tr>
<td>(7100-3100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 03</td>
<td>8 momentary switches and instructions for replacing from panel toggle switches. Field Installation Only.</td>
<td>$90.00</td>
</tr>
<tr>
<td>(7100-3130)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**REMOTE CONTROL INTERFACE ACCESSORIES**

<table>
<thead>
<tr>
<th>MODEL/DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FSU-01</strong></td>
<td>To provide full compliance with FCC Rules by monitoring 4 critical parameters, plus aurral power and visual power.</td>
<td>$1,360.00</td>
</tr>
<tr>
<td>Fail-Safe Unit for TV (5116-0FSU)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ADS-01</strong></td>
<td>Switch from main to alternate data path when invalid data is detected from either the Control or the Remote terminal. Both local and remote units are included.</td>
<td>$1,860.00</td>
</tr>
<tr>
<td>Alternate Data Path Selector (5116-0ADS)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CSA-01</strong></td>
<td>To provide isolation from a floating circuit to a grounded circuit. DC gain is also provided.</td>
<td>$560.00</td>
</tr>
<tr>
<td>Chopper Amplifier (5116-0CSA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PLC-01</strong></td>
<td>To linearize power readings from log scale to linear scale.</td>
<td>$715.00</td>
</tr>
<tr>
<td>Power-to-Linear Converter (5116-0PLC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TLK-01</strong></td>
<td>To monitor AC line current</td>
<td>$315.00</td>
</tr>
<tr>
<td>Tower Light Monitor (5116-0TLK)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>LVK-01</strong></td>
<td>To monitor AC line Voltage</td>
<td>$245.00</td>
</tr>
<tr>
<td>Line Voltage Monitor (5116-0LVK)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PVK-01</strong></td>
<td>To monitor plate voltage up to 20 kV</td>
<td>$240.00</td>
</tr>
<tr>
<td>Plate Voltage Monitor (5116-0PVK)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>TSK-01</strong></td>
<td>To monitor temperature of air or components</td>
<td>$425.00</td>
</tr>
<tr>
<td>Temperature Sensing Kit (5116-0TSK)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MBB-01</strong></td>
<td>For monitoring voltage and current at 10 kV above ground and translate reading in reference to ground voltage to suit the input of the Remote Control terminals.</td>
<td>$375.00</td>
</tr>
<tr>
<td>Isolation amp (high voltage) (5116-0MBB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SCA1</strong>, SCA Generator (5116-SCA1)</td>
<td>Standalone unit converts FSK from modem to SCA frequency. (Specify operating frequency)</td>
<td>$840.00</td>
</tr>
<tr>
<td><strong>SCA2</strong>, SCA Detector (5116-SCA2)</td>
<td>Standalone unit converts SCA frequency to FSK. (Specify operating frequency)</td>
<td>$840.00</td>
</tr>
<tr>
<td><strong>SCA3</strong>, SCA Generator/Detector (5116-SCA3)</td>
<td>Standalone unit combines functions of SCA1 and SCA2 (Specify two operating frequencies)</td>
<td>$1,110.00</td>
</tr>
</tbody>
</table>

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3090 Oakmead Village Drive, P.O. Box 58088, Santa Clara, CA 95052-8088 • (408) 727-7272, FAX (408) 727-5942, TWX 910-338-0584
Model 753
**AM Modulation Monitor.** Shown with the optional 755A preselector. The 753 guarantees you the most out of your AM transmitter . . . right up to the legal limit.

Model 840
*C-Quam® Exciter for AM Stereo.* Second-generation design with ease of utility and maintainability at a competitive price to make **you** competitive in the rough world of AM Stereo radio. *C-Quam®* is a registered trademark of Motorola, Inc.

Model 701
**TV Monitor.** The 701 still outsells its rivals after 17 years! A precision monitor for visual and aural carrier frequencies and aural modulation. CCIR option available.

System 7610
**Remote Control System.** The most economical method of manipulating your transmitter via TELCO or STL. Basic system provides 10 channels each of Raise, Lower, and telemetry. Flexible expansion capability by adding subsidiary units.

System 7815
**Remote Control and Status Monitoring System.** Offers 15 on/off control and 15 status indication channels. The 7815 is expandable to 45 channels of control and 79 channels of status indications.

Series 760 EBS
**EBS System.** The most popular EBS Receiver/Generator/Decoder system . . . literally thousands in use daily. Meets FCC requirements. Complete system or fractional packages are available.

**SHORT FORM CATALOG**

- AM/FM/TV MONITORS
- BTSC AURAL TV
- STL/TSL
- REMOTE CONTROL
- EBS

*NET INC... Where new things are happening!*

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P.O. Box 58088
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FAX: (408) 727-5942
Model 844
*FM/Stereo Modulation Monitor.* The industry’s newest FM baseband and stereo monitor . . . in one 7” package. The 844 features a 2-channel preselector for off-air monitoring and comprehensive front-panel measuring capabilities. Auxiliary composite input allows stereo generator and composite STL checks. The 844’s unique Peak Modulation Duration Differentiator (PMDD) circuit detects only true over-modulation spikes and ignores those created by transients, multi-path and overshoot. Companion SCA Monitor: Model 845.

Model 850
*Aural Modulation Monitor for BTSC TV Stereo.* Complies fully with the BTSC Aural Modulation Monitor Standards for recommended measurements and more. Look at total modulation, main channel, left or right channel. Microprocessor-controlled switching permits measurement of over 20 parameters. Both split-sound and quasi-parallel (intercarrier mode) demodulation schemes are used to recover the aural baseband signal. Accommodates optional Distortion Analyzer (model 860). Model 851 available for baseband input only.

Model 8500
*Composite Subcarrier Generator for BTSC Stereo.* The 8500 Generator combines the output of a BTSC Stereo Generator, SAP Generator, Pro-Channel Generator, and SCA Generator or Remote Control link, for transmission via a single video microwave subchannel.

Model 8501
*Composite Subcarrier Demodulator for BTSC Stereo.* The 8501 Demodulator routes the composite stereo and SAP and Pro channels to the aural exciter.

Model 8300 STL
*Aural STL and Inter City Relay.* When it comes to transporting the cleanest, most transparent audio via microwave, the 8300 system is ahead of the rest . . . even in dense RF environments. If multihop links are involved, the 8300 with its unique IF repeater circuitry ensures the audio quality at the origin is relayed through 3, 4, 5 hops to the RF transmitter. The 8300’s economical counterpart is the 7700 STL. Available in mono, dual mono, or composite configurations, without degrading separation, deteriorating signal-to-noise or adding distortion.

Model 8600 STL
*Aural STL.* An economical, discrete 950 MHz system derived from our 8300 system. Designed for either single or dual monaural operation. Built-in subcarrier generator and demodulator for voice and data linking, spurious-free power amp, built-in mic and headphone jacks, and capability to properly match phase and gain between dual links for either FM or AM stereo applications.

See Reverse
FEATURES

- Designed to utilize the new FCC narrowband spectrum allocations.
- Optimized for single channel or dual monaural operation.
- Front panel accessible subcarrier SCA generator and de-modulator for supervisory or data link.
- Spurious-free, on-channel power amplification.
- Built-in adjustments for phase and gain matching between dual links.
- Interfaces to optional Automatic Changeover Units.
- Two Year Limited Warranty.

GENERAL DESCRIPTION

The Model 8600/8601 is an economical, high-quality Studio-To-Transmitter (STL) system which is specifically designed for either single channel or dual monaural channel radio broadcast applications.

FCC rulings permit 100 kHz “drop-ins” in the 950 MHz STL band. The 8600 system meets the FCC criteria which permits broadcasters to use a monaural link between two composite links. It is an ideal narrowband system which is optimized for operation in congested STL environments. The system is designed to deliver superlative audio quality without signal degradation or adjacent channel interference.

Based upon TFT’s 10+ year’s experience with STL designs (like our sophisticated 8300 and 7700B Series of Composite STLs), the 8600 System incorporates the latest microwave components and LSI devices.

The nominal 6-watt power output is generated by direct, on-channel amplification which yields greater efficiency and introduces no harmful, spurious emissions like those in a varactor diode multiplier.

The built-in 39 kHz FM subcarrier generator and de-modulator may be utilized for either data transmission or supervisory channel. The supervisory channel may be used for studio-to-transmitter voice communications via the transmitter front panel microphone input and the headphone jack on the receiver. This voice channel temporarily interrupts the data link.

When two systems are used for stereo, provision is made for properly matching phase and gain between the dual links by an internal adjustable phase and amplitude compensation circuit.

Both Transmitter (8600) and Receiver (8601) feature comprehensive front panel metering for monitoring of system performance.

The 8601 Receivers occupy only a half-width, 3½" high rack space; thus, two may be mounted side-by-side. A mounting bracket and a front panel cover plate are included with the single Receiver System.

System shown above shows dual-link, redundant receivers. At the studio or transmitter, only 3½" of rack space is required.
Microphone input jack for voice communication via built-in subcarrier channel (interrupts rear panel MUX input).

Front panel switch to control RF power amplifier status.

LED indicator alerts the loss of PLL-lock.

Multi-scale analog meter monitors program modulation, MUX injection and other critical operating parameters. Meter function is selected by pushbuttons.

Terminal strip for disabling internal subcarrier generator, and a BNC connector for an external unit.

Type “N” antenna output.

Optional battery input terminals.

Balanced and unbalanced program audio and MUX inputs via terminal strips and BNC connectors.

Receptacle for interfacing with TFT Model 7770, Transmitter Automatic Changeover Unit.

AC power line input assembly with RFI filtering, power line fuse and simple changeover from 115 VAC to 230 VAC.

Transmitter Combiner and Receiver Splitter.

For stereo installations where two 8600 Series Transmitters and Receivers each share a common antenna, TFT can furnish a high isolation combiner and a low-loss splitter.

The Transmitter Combiner features more than 80 dB isolation between transmitters. Intermodulation components, (which cause harmful emissions that interfere with other radio users and thereby negate the advantages of narrowband STL’s) are virtually eliminated.

This rugged, compact unit provides all required filtering between transmitters for harmonic and intermodulation suppression. There is nothing to tune after initial installation. The use of semi-rigid cable and a minimum of connectors ensure reliable protection.
ACCESSORIES

Model 7770 Transmitter Automatic Changeover unit is a 13/4" high rack mount unit which monitors critical parameters in the transmitters. If a fault is detected, it automatically switches the antenna to the hot standby transmitter. Changeover can also be accomplished by a front panel switch or relay contact closure in the remote control equipment.

Model 7773 Receiver Automatic Changeover unit. Similar to the Model 7770, it monitors the parameters in the receivers. The unit switches the program channel output as well as subcarrier output.

Other Accessories

TFT carries a full line of accessories such as coaxial cable, type "N" connectors and antennas to meet STL system installation requirements. Please refer to the STL Accessories brochure for detailed information.

ORDERING GUIDE

8600 System “C”: Part Number: 5115-8600C:
Monaural transmitter and receiver. Specify one operating frequency.

8600 System “E”: Part Number: 5115-8600E:
Two monaural transmitters (2) and two receivers (2) for separate left and right channel. System “E” requires one transmitter combiner and one receiver splitter for single transmit/single receive antenna operation. Specify two operating frequencies.

Transmitter Combiner: TFT Part Number 7100-4145
Receiver Splitter: TFT Part Number 3500-0021
Spare Parts Kit: TFT Part Number 7100-4135
Model 7770 Transmitter Automatic Changeover Unit.
Model 7773 Receiver Automatic Changeover Unit.
**SYSTEM**

Frequency Range .......... 840-960 MHz standard
Other frequencies available on request.

Frequency Response .......... Program: ± 0.2 dB or better, 30 Hz to 15 kHz.
MUX: ± 3 dB, 50 Hz to 5 kHz.

Distortion (THD & IMD) .......... 0.2% or less at 1 kHz.

Signal-to-Noise Ratio .......... 65 dB or better below 100% modulation, de-emphasized.

**SPECIFICATIONS**

**RECEIVER/8601**

RF Input Connector .......... Type N Female, 50 ohms.

Sensitivity .......... 14 microvolts required for 55 dB SNR, de-emphasized. 100 microvolts for 65 dB SNR, de-emphasized.

Selectivity (6 dB BW) .......... 125 kHz maximum. (40 dB BW) 300 kHz maximum.

Contents subject to change without notice.

**TRANSMITTER/8600**

RF Power Output .......... 6 Watts.

RF Output Connector .......... Type N Female, 50 ohms.

Deviation for 100% Program Modulation .......... ± 22 kHz.

Deviation for 100% Subcarrier Modulation .......... ± 3 kHz.

Subcarrier Injection into Main Carrier .......... ± 3 kHz.

Frequency Stability .......... Better than 0.0001%, 0°C to 50°C.

Spurious and Harmonic Emission .......... 60 dB or more below carrier level.

Modulation Capability .......... One monaural program and one subcarrier (built-in or external).

Modulation Inputs .......... Program: 1.24 VRMS for 100% modulation, 3k ohms, balanced and unbalanced, BNC and terminal strip.
MUX audio: 0.775 VRMS for 100% modulation of internal subcarrier generator, 1k ohms.
External Subcarrier: 0.53 VRMS for 100% injection, 10k ohms.

Power Source .......... 115/230 VAC ± 10%, 50/60 Hz, 10 Watts. 12 VDC optional.

Monitoring Capability .......... One 2½" analog meter for monitoring power supply, 1 to 120% modulation for program and multiplex channels, RF input level, and VCO bias.

Dimensions and Weight .......... 8600: 3½" x 19" x 12½" (14 lbs. net).
8601: 3½" x 19½" x 14½" (7 lbs. net).
Dual receivers occupy 19" width. Single receiver includes hardware to extend width to 19".

**Transmitter Combiner, TFT Part Number 7100-4145**

Frequency Range .......... 950 MHz band.

Impedance .......... 50 ohms.

Isolation .......... Transmitter to Transmitter: Greater than 80 dB.
Antenna to Transmitter: Greater than 45 dB.

Insertion Loss .......... 3.5 dB.

Attenuation, Harmonic and IM Products .......... 30 dB.


Input VSWR, Ref. 50 Ohms .......... 1.25:1.

Frequency Separation, Transmitter to Transmitter .......... 2MHz maximum.

Temperature Range .......... -30°C to +60°C.

Connector Type .......... N Female.

Dimensions and Weight .......... 19" x 3½" x 3½" 4 lbs., net.

**Receiver Splitter, TFT Part Number 3500-0021**

Insertion Loss .......... 3.2 dB.

Impedance .......... 50 ohms.

VSWR .......... 1.3:1.

Isolation .......... 20 dB.

Connector Type .......... N Female.

Dimensions and Weight .......... 1½" x 1½" x 3½" 4.5 oz., net.

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3000 Oakmead Village Drive, P.O. BOX 58088
Santa Clara, CA 95052-8088
Tel (408) 727-7272  FAX (408) 727-5942  TWX 910-338-0584
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**FEATURES & BENEFITS**

- Designed specifically for MTS/BTSC Stereo transmission; transparent to the Composite Baseband signal.
- Transmits entire Composite Signal on a single Subcarrier above Video; frees-up one to three Subcarriers.
- Keeps all BTSC equipment at the studio; eliminates maintenance trips to the transmitter site.
- Saves on BTSC equipment costs; no duplication of generators and audio processors for Multi-Point TV sites.
- Automatic Modulation Control (AMC) maintains precise modulation levels for best BTSC stereo separation.
- Loop-thru connection; compatible with today’s video microwave equipment.
- 700 kHz Subcarrier spacing; compatible with conventional microwave subcarrier systems.

**GENERAL DESCRIPTION**

The 8500 Series is a composite subcarrier system consisting of an ultralinear wideband subcarrier generator, Model 8500 and its companion demodulator, Model 8501. The system transmits the entire BTSC composite baseband—Stereo, SAP and Professional Channel—from the studio to the transmitter site using only one microwave subcarrier frequency. This subcarrier, centered between 4.5 MHz and 10 MHz, modulates the video microwave STL in conjunction with the video signal and existing subcarriers.

Conventional monaural subcarrier system can only accept a single 15 kHz audio channel; thus, up to four separate monaural subcarrier generators and demodulators are needed to convey the Left, Right, SAP and Professional channels. This transmission method also inhibits convenient access for routine adjustments because it requires that the BTSC generators and associated audio processing equipment be located at the transmitter site.

**KEEP BTSC STEREO EQUIPMENT AT THE STUDIO**

The TFT 8500 system approach allows the BTSC composite signal to be generated at the studio.

(continued—over)
This signal remains in composite form and is transparent from the output of the BTSC generators to the input of the aural transmitter. The only remaining influence—amplitude variation of the composite signal itself due to the video STL link—is eliminated by a digital Automatic Modulation Control (AMC) circuit in the Model 8501 Subcarrier Demodulator. Other "wide-band" systems derived from conventional subcarrier systems lack this crucial feature and thus cannot maintain optimum stereo separation performance.

**COMPOSITE OFFERS HIGH-PERFORMANCE, RELIABILITY, AND CONVENIENCE**

The success of transmitting an entire high-quality FM stereo composite signal on one subcarrier has been demonstrated by its frequent use and reliable performance for over 20 years in radio broadcasting. These same benefits of superior performance, reliability and convenience are now available for TV audio.

**COMPATIBLE WITH EXISTING VIDEO STL SYSTEMS**

The generous bandwidth of video microwave STL and the wide spacing of the commonly-used subcarrier frequencies easily accommodate the composite 8500 system. The wideband signal "fits" in the 700 kHz subcarrier space normally occupied by ordinary monaural subcarrier systems without interference or sacrifice in performance.

**IDEAL FOR MULTI-POINT SYSTEMS**

In a multi-point microwave system where the BTSC transmission format is used, a single set of BTSC generators is all that is needed at the head-end to drive the entire system.

At each receive site, only the Model 8501 is required; redundant (and expensive) additional generators and audio processing equipment is unnecessary before final broadcast.

**8500 COMPOSITE SUBCARRIER GENERATOR**

The 8500 Composite Subcarrier Generator includes separate inputs to combine any or all the outputs from a BTSC generator, SAP Generator and Professional Channel Generator—or a source of composite signal where the signals are already combined. The 8500 output is a single FM subcarrier in the range of 4.5 MHz to 10 MHz. Separate controls adjust the level of each input; an output level control is also provided. The subcarrier loop-thru configuration facilitates connection to most popular video STL's and their subcarrier generators. A test meter with selectable functions aids in set-up and diagnostics. A rear-panel alarm output is provided for loss-of-modulation or subcarrier.

**8501 COMPOSITE SUBCARRIER DEMODULATOR**

The Model 8501 Composite Subcarrier Demodulator derives the BTSC composite baseband signal from the video microwave receiver's subcarrier output to directly feed the aural exciter input. A digital Automatic Modulation Control (AMC) circuit provides a constant modulation level to the aural exciter. Any level variations of the composite signal due to modulation, demodulation, component aging, or temperature changes in the associated STL equipment are automatically corrected by the AMC circuit.

Set-up is accomplished from the front panel or by remote control via the rear panel connectors. The set-up is retained in non-volatile memory and is unaffected by power interruptions. Both input and output level controls are provided; the input is made via a convenient subcarrier loop-thru connection. A test meter with selectable functions aids in set-up and diagnostics and a rear-panel alarm output is provided for loss-of-modulation or subcarrier.

Multi-burst video and the modulated subcarriers at 6.2 MHz, 6.8 MHz and 7.5 MHz. 6.8 MHz is the composite subcarrier.
TV STL Composite Subcarrier System

8500 System Connection for Microwave transmission into a combined Video and Subcarrier Input.

Model 8500 Composite Subcarrier Generator Block Diagram

Model 8501 Composite Subcarrier Demodulator Block Diagram
**SPECIFICATIONS**

**SYSTEM**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subcarrier Frequencies</td>
<td>4.5, 6.2, 6.8 or 75 MHz standard; others between 4.5 MHz and 10 MHz available on special order.</td>
</tr>
<tr>
<td>Frequency Accuracy &amp; Stability</td>
<td>± 0.01% of center frequency, phase-locked to an internal crystal oscillator.</td>
</tr>
<tr>
<td>Type of Modulation</td>
<td>Stereo Channel: 70 dB (de-emphasized) SAP Channel: 55 dB (de-emphasized) Professional Channel: 40 dB (3 kHz bandwidth)</td>
</tr>
<tr>
<td>Stereo Separation</td>
<td>± 0.2 dB, 50 Hz to 50 kHz ± 1.0 dB, 50 kHz to 120 kHz</td>
</tr>
<tr>
<td>Signal-to-Noise Ratio:</td>
<td>Baseband Frequency Response ± 0.2 dB, 50 Hz to 50 kHz ± 1.0 dB, 50 kHz to 120 kHz</td>
</tr>
<tr>
<td>Total Harmonic Distortion (THD)</td>
<td>0.2% 1 kHz (de-emphasized)</td>
</tr>
</tbody>
</table>

**MODEL 8500 SUBCARRIER GENERATOR**

**Input Requirements:**
- Composite Signal: 10 VRMS for ±150 kHz deviation.
- Stereo Channel: 10 VRMS for ±13 Hz deviation.
- SAP Channel: 10 VRMS for ±30.8 kHz deviation.
- Professional Channel: 10 VRMS for ±6.2 kHz deviation.

**Input impedances:** 75 ohms, BNC.

**Subcarrier Output:** 20 mV to 150 mV p-p variable into 75 ohms load, preset at the factory to 100 mV.

**Output Impedance:** 15 k ohms, BNC Loop-thru, bridging.

**Controls:** Input Level, Subcarrier Output Level.

**Indicators:** Loss-of-Modulation, Loss-of-Subcarrier and PLL Unlock LED's.

**Metering:**
- Composite Modulation: 100% = ±150 kHz deviation
- Stereo Channel Modulation: 100% = ±113 kHz deviation
- SAP Channel Modulation: 100% = ±30.8 kHz deviation
- Professional Channel Modulation: 100% = ±6.2 kHz deviation
- Subcarrier Output Level: 100% = 100 mV p-p
- Phase-Lock Loop: PLL Control Voltage

**MODEL 8501 SUBCARRIER DEMODULATOR**

**Input:** 20 mV to 500 mV p-p, 1 k ohms bridging, BNC, loop-thru.

**Composite Output Level:** 1 VRMS for ±150 kHz deviation, +6 dB to −12 dB adjustable range, across 75 ohms, BNC.

**Automatic Modulation Control (AMC):** An automatic level control circuit to maintain composite signal level to the TV aural exciter within ±0.5% when the variation in the composite level to the microwave link varies up to ±10%.

**Metering:** Input Level, Output Level and Automatic Modulation Control Voltage Level.

**Controls:** Input Level, Output Level and Automatic Modulation Control Adjustment (local and remote access).

**Indicators:** Automatic Modulation Control Defeat and Subcarrier & Modulation Alarms.

**MECHANICAL AND ENVIRONMENTAL (Models 8500 & 8501)**

**Operating Temperature:** 0°C to 50°C

**Size and Net Weight:** 19" (48.6 cm) Wide x 17.5" (4.4 cm) High x 12" (30.4 cm) Deep; 10 lbs (4.5 kg) net.

**Input Power:** 115/230 VAC, ±10%, 50-400 Hz, 25 watts maximum.

**ORDERING GUIDE**

TFT Model 8500 Television Microwave Subcarrier Generator, P/N 5116-8500.

TFT Model 8501 Television Microwave Subcarrier Demodulator, P/N 5116-8501

Please specify the desired subcarrier frequency: 4.5, 6.2, 6.8 or 75 MHz standard; others available between 4.5 MHz and 10 MHz on special order.

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SCRAP LEFT & RIGHT.
LISTEN TO YOUR PEERS.

KHON—Honolulu, Hawaii
Mr. Bill Hayes, Chief Engineer

"... we can now feed the cable system directly from the studios with a fully encoded BTSC signal... for a very low cost we'll be able to convert the Maui transmitter to stereo. ... We have excellent phase response throughout the broadcast chain... the aural quality is superior to what we were using before."

KTGF—Great Falls, Montana
Mr. Roy Dasher, Chief Engineer

"I'm very satisfied with the quality. It also frees-up the internal subcarrier channels on the existing system; one for control, the other two are for future use. I'm also able to feed a microwave link to the cable head without problems."

KXTV—Sacramento, California
Mr. Rod Robinson, Chief Engineer

"It's transparent, with no problems at all; I don't have to worry about stereo phasing because it keeps the generator and the processing at the studio. It's a huge convenience! If you do have a problem with your BTSC you know where to go because all your stereo equipment stays in the studio where it belongs."

KUTV—Salt Lake City, Utah
Mr. Reid Carpenter, Chief Engineer

"... it's much easier to get everything right at the source with the 8500 system. It's very stable; the AMC circuit works very well. It's proven itself to be true to TFT's specs. ..."

WTMV—Lakeland, Florida
Mr. Bill Brister, Chief Engineer

"I've been using it for approximately one year now and I think it's great! I can get to it easily because it's in the studio. I can set levels and not worry about the signal quality at the transmitter."

WYFF—Greenville, South Carolina
Mr. Mike LaBoone, Chief Engineer

"I like the idea of having the control here; audio processing belongs at the studio, not the transmitter. The 8500 system freed-up 2 other subcarriers for me; one is for mono standby while the other is for remote. My recent tests have shown that the only thing better is a straight wire."

These candid comments were compiled from an extensive list of satisfied TFT Model 8500 Series TV STL Composite Subcarrier System users.

For full technical information on the 8500 Series System and our comprehensive line of precision BTSC Monitoring equipment please contact us or your favorite TFT dealer.

© 1987, TFT, Inc.
FEATURES
- Multiple Subcarrier Capability
- Full Monitoring and Measurement Capability
- Built-in Modulation Calibrator
- Optional RF Pre-Selector
- Optional Service Channels for continuous signal monitoring information

GENERAL DESCRIPTION
To accommodate today's multi-channel SCA operations, the 845 FM SCA Monitor is designed to handle up to three (3) user-specified FM-subcarrier frequencies, selectable from the front panel.

Applications include: Independent off-air SCA Monitoring, SCA Proof-of-Performance measurements, and checking the specifications of a subcarrier generator.

In addition, one or two optional Service Channel plug-in boards provide uninterrupted SCA program or data output(s) separate from the monitor portion of the 845.

The 845 will allow you to maintain high quality FM broadcasting while providing the capability to check the quality of your SCA broadcast. With the optional Service Channel plug-in board the 845 provides uninterrupted subcarrier output and demodulated signal of the subcarriers. A Loss-of-Modulation alarm is also provided with this option.

INDEPENDENT OFF-AIR SCA MONITOR
An optional RF Module allows the Model 845 to be used as a stand-alone off-air SCA Monitor. The RF Module consists of a crystal-controlled, single channel RF pre-selector and high-quality FM demodulator circuit. The output of the FM demodulator feeds the input of the Model 845 when this option is ordered.

FREQUENCY-SYNTHESIZED TYPE MODULATION CALIBRATOR
A frequency-synthesized type FM modulation calibrator is built-in for calibration of the modulation meter and peak flashers. The highest stability and accuracy are determined by crystal oscillators which remain stable regardless of temperature or age. No external equipment is required to use the modulation calibrator. Accuracy exceeds 1.0%, year-after-year. This feature eliminates the need for Bessel null calibration.

ACCURATE PEAK MODULATION DETECTION—P.M.D.D.™
The 845 features an exclusive Peak Modulation Duration Differentiator (P.M.D.D.™). This feature is incorporated into a peak modulation detecting circuit to identify true modulation peaks and separate them from other peaks caused by transient noise, overshoot and multipath distortion.

ADJUSTABLE PEAK MODULATION FLASHERS
Dual LED Peak Modulation Flashers may be digitally set in 1.0% steps over a broad range: 50% to 199% modulation (simultaneous positive and negative modulation). A thumbwheel switch eliminates the ambiguity and imprecision of potentiometer type controls.

(continued—over)
**BUILT-IN VOLTMETER & ATTENUATOR**

For low-level modulation and noise measurements, a switchable 50 dB attenuator is built-in (in 10 dB steps) to perform a complete Proof. The only other equipment you need is a distortion analyzer and an audio generator.

**OPTIONS**

Model 805 Remote Metering Panel
This rack mount panel (19") duplicates the peak flashers and meters on the 845's front panel. 50 feet of cable is provided.
TFT Part Number: 5116-0805.

Option 01
An RF Pre-selector and FM Demodulator module allows use of the 845 as a stand-alone monitor/receiver for off-air monitoring of SCA channels. RF input sensitivity is better than 20 µV.
TFT Part Number: 7100-3880.

Option 02
**OPTIONAL SERVICE CHANNELS**

The Model 845 can be augmented with one or two optional plug-in Service Channels. These provide SCA data quality demodulated audio (independent of the operation of the channel selector of the monitor). This permits uninterrupted audio or data output. For example, this feature will allow remote control telemetry information on one of the subcarriers to pass through when checking the performance of other SCA channels without interruption to the others.

**ORDERING INFORMATION**

Model 845 FM-SCA Subcarrier Modulation Monitor
Optional Factory installed and tested RF Pre-Selector and FM Demodulator Assembly: TFT Part No. 6608-3573, specify RF frequency.

Optional Service Channel Plug-in Board: TFT Part No. 6608-3572, specify FM-subcarrier frequency.

---

Model 845 shown with companion Model 844 Baseboard/Stereo Modulation Monitor. See separate brochure for Model 844.
MODEL 845 SUBCARRIER MODULATION MONITOR
BLOCK DIAGRAM

COMPOSITE INPUT

RF-PRESELECTOR & FM DEMODULATOR (OPTIONAL)

UP CONVERTER

UP-CONVERTER

455 kHz IF

PULSE COUNTING FM DEMODULATOR

METER & PEAK FLASHER

TEST METER

PEAK MODULATION FLASHERS

TO REAR PANEL

SCA FREQUENCY SELECT

FREQUENCY SYNTHESIZED MODULATION CALIBRATOR

OFF-FREQUENCY ALARM

TO REAR PANEL

SERVICE CHANNEL & MODULATION ALARM (OPTIONAL)

2ND SERVICE CHANNEL (OPTIONAL)

DEMODULATED SUBCARRIER OUTPUT

ALARM OUTPUT

SUBCARRIER OUTPUT

TO REAR PANEL
**INPUT, COMPOSITE BASEBAND**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Signal</td>
<td>Composite or single subcarrier selectable from front panel switch.</td>
</tr>
<tr>
<td>Signal Level, Connector</td>
<td>10 V, 600 ohms unbalanced, BNC.</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>49 kHz to 125 kHz.</td>
</tr>
<tr>
<td>Subcarrier Frequencies</td>
<td>Three crystal-controlled frequencies selectable from front panel switch, 67 kHz supplied standard.</td>
</tr>
</tbody>
</table>

**METER MEASUREMENTS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meter range</td>
<td>0 to 133%, and dB scale.</td>
</tr>
<tr>
<td>Meter characteristics</td>
<td>3½” illuminated scale.</td>
</tr>
<tr>
<td>Meter attenuator range</td>
<td>50 dB in 10 dB steps, pushbutton selectable.</td>
</tr>
<tr>
<td>Total Modulation Measurement:</td>
<td>± 75 kHz</td>
</tr>
<tr>
<td>100% modulation</td>
<td>± 4%</td>
</tr>
<tr>
<td>Modulation Accuracy</td>
<td>± 0.5%, 5% to 30% injection level.</td>
</tr>
<tr>
<td>Injection Accuracy</td>
<td>± 2%</td>
</tr>
<tr>
<td>SCA Subchannel Measurement:</td>
<td>± 4KHz or ± 6KHz, pushbutton selectable.</td>
</tr>
<tr>
<td>Modulation accuracy (100% modulation, 1 kHz tone)</td>
<td>± 2%.</td>
</tr>
<tr>
<td>Audio Frequency Response:</td>
<td></td>
</tr>
<tr>
<td>Composite input</td>
<td>± 2.0 dB, 40 Hz to 6.0 kHz or (bandpass filter in)</td>
</tr>
<tr>
<td>(bandpass filter in)</td>
<td>± 3.0 dB, 20 Hz to 7.5 kHz.</td>
</tr>
<tr>
<td>*Subcarrier input</td>
<td>± 0.5 dB, 20 Hz to 7.5 kHz.</td>
</tr>
<tr>
<td>(bandpass filter out)</td>
<td></td>
</tr>
</tbody>
</table>

**INTERNAL CROSSTALK**

*Main to SCA; Stereo to SCA; and SCA to Main — 66 dB.

*Wideband input measurement.

**SCA PEAK MODULATION INDICATORS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable Peak Indicators</td>
<td>Positive and negative modulation LED flashers, peak limit set by thumbwheel switches in 10% increments from 50% to 199%.</td>
</tr>
<tr>
<td>Accuracy</td>
<td>± 10%</td>
</tr>
</tbody>
</table>

**SCA MODULATION AND INJECTION LEVEL CALIBRATOR**

Built-in modulation and injection level calibrator for calibrating modulation meter and the peak flashers from the front panel. Accuracy: ± 10%.

**SPECIFICATIONS**

**SCA MODULATION MEASUREMENT**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCA carriers</td>
<td>Available on front panel for external frequency counter.</td>
</tr>
<tr>
<td>Off-frequency Indicator</td>
<td>LED on when SCA carrier frequency is ± 500 Hz off.</td>
</tr>
</tbody>
</table>

**OUTPUTS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCA subcarrier</td>
<td>500 mV, into 5K ohms (front panel).</td>
</tr>
<tr>
<td>Audio (with 150 µsec de-emphasis)</td>
<td>2 VRMS, 600 ohms balanced at 400 Hz, 100% modulation, follows subchannel selected by front panel switch.</td>
</tr>
<tr>
<td>*Audio Distortion</td>
<td>0.5% at ± 6 kHz.</td>
</tr>
<tr>
<td>*Signal-to-noise</td>
<td>66 dB with de-emphasis.</td>
</tr>
</tbody>
</table>

**OUTPUTS, OPTIONAL SERVICE CHANNEL**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio</td>
<td>2 VRMS, 600 ohms unbalanced at 400 Hz, 100% modulation.</td>
</tr>
<tr>
<td>Audio Distortion</td>
<td>3.0% maximum.</td>
</tr>
<tr>
<td>Signal-to-Noise ratio</td>
<td>50 dB with de-emphasis.</td>
</tr>
<tr>
<td>Loss of Modulation</td>
<td>Relay contact closures.</td>
</tr>
</tbody>
</table>

**OUTPUTS, FRONT AND REAR PANEL**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio (without de-emphasis)</td>
<td>2 VRMS, 600 ohms unbalanced at 100% modulation, follows subchannel selected by front panel switch.</td>
</tr>
<tr>
<td>Remote meter and flashers</td>
<td>For Model 805 remote meter and flasher panel.</td>
</tr>
<tr>
<td>Connectors</td>
<td>BNC on front panel, terminal block on rear panel.</td>
</tr>
</tbody>
</table>

**MECHANICAL AND ENVIRONMENTAL**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input power</td>
<td>115/230 VAC, ±10%; 50 to 400 Hz, 40 watts maximum.</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>0°C to 50°C (32°F to 122°F).</td>
</tr>
<tr>
<td>Size</td>
<td>3½” (8.89 cm) high × 19” (48.26) wide × 14.75” (3747 cm) deep</td>
</tr>
<tr>
<td>Net weight</td>
<td>Approximately 9.5 pounds (4.3 kg)</td>
</tr>
<tr>
<td>Shipping Weight</td>
<td>Approximately 12.5 pounds (5.6 kg)</td>
</tr>
</tbody>
</table>

**Today’s TFT, INC**

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BTSC TV SAP/Pro Channel Monitor

FEATURES

- Independent SAP and Professional Channel Sections
- Separate Meters for Modulation and Injection
- Off-Frequency LED Indicators
- Selectable Operating Modes:
  - Switchable bandpass filter for operation with subcarriers individually (when performing a Proof) or with entire composite signal.
  - Switchable dbx* decoder or 75 µsec de-emphasis, or flat response (15 kHz bandwidth) in SAP Channel.
  - Switchable de-emphasis (150 µsec de-emphasis or flat, 6 kHz bandwidth, in Pro Channel for data or voice applications.
- Peak Modulation Flashers with Thumbwheel Switch Presets.
- Built-in Frequency-Synthesized Modulation Calibrator.
- Demodulated Signals available via Front Panel BNC.

GENERAL DESCRIPTION

COMPLETE BTSC MONITORING/FULL COMPLIANCE WITH BTSC RECOMMENDED PRACTICES

The TFT Model 855 BTSC SAP and Pro Channel Modulation Monitor was designed for those broadcasters who utilize the Second Audio Program (SAP) and/or Professional Channel (Pro) as part of their BTSC broadcast signal. It is designed to monitor and measure SAP and Pro Channel performance characteristics as defined by the EIA/BTSC System Multichannel Television Sound Recommended Practices. It can also be used to check the performance of SAP/Pro generators.

The 855 can accept signals from any source of BTSC composite signal consisting of SAP/Pro—such as the feed from the TFT Models 850 or 851 BTSC stereo monitors or other wideband audio demodulator—or can accept signals from SAP and Pro generators directly.

The 855 incorporates independent SAP and Pro Channel sections. Each section includes separate modulation and injection meters and peak modulation flashers. Switchable modes permit extensive monitoring and measurement flexibility. A front panel BNC output provides convenient connection of monitored signals to ancillary test equipment, such as TFT’s Model 860 Multifunction Audio Analyzer which plugs into the TFT 850/851 BTSC Stereo Modulation Monitors.

Positive and negative peak flashers with thumbwheel presets incorporate TFT’s exclusive PMDD* (Peak Modulation Duration Differentiator) circuitry to accurately register signal peaks.

Off-frequency LED’s warn of carrier drift beyond ±500 Hz.

The 855 incorporates a built-in synthesized type modulation calibrator to ensure monitor accuracy, year after year. Separate injection calibration trimmers aid in monitor set-up.

* dbx is a registered trademark of dbx Corp.
INPUT

Composite Audio .......... 75 ohms unbalanced, 0.5 – 2.0 VRMS (from TFT Models 850 or 851, Tektronix 1450, etc.), BNC.

Frequency Range .......... 50 kHz to 125 kHz.

METERS

SAP Channel Modulation .......... Meter ballistics meet BTSC requirements, 0–130% calibration.

Pro Channel Modulation .......... Same as above.

SAP Channel Injection Error .......... Zero center meter, calibrated in ± 30% error from BTSC standard of 15 kHz injection.

Pro Channel Injection Error .......... Same as above, except reference injection is 3 kHz.

PEAK MODULATION INDICATORS

Four peak flasher LED's indicate plus or minus peaks simultaneously for SAP and Pro Channels. Peak limits set by thumbwheel switches in 1.0% increments from 0% to 199%. Accuracy, ± 1.0%.

MODULATION LEVEL CALIBRATOR

Built-in frequency-synthesized type calibrator for meter and peak flasher calibration (100% modulation) from the front panel. Accuracy, ± 1.0%.

OUTPUTS

Front Panel BNC

SAP Carrier .......... 260 mV into 5k ohms, for external frequency counter, etc.

Pro Channel Carrier .......... Same as above.

Composite Input .......... Buffered input signal, approx. 1.5 VRMS into 5k ohms.

SAP Channel Modulation .......... 1.77 VRMS, 75 ohms unbalanced at 100% modulation, follows decoder/75 µsec/flat pushbutton selection.

Pro Channel Modulation .......... Same as above, follows 6 kHz flat/150 µsec pushbutton selection.

Rear Panel

SAP Channel Audio .......... 3.54 VRMS, balanced 600 ohms, rear panel barrier strip.

Pro Channel Audio .......... Same as above.

ALARMS

Separate alarm outputs for SAP and Pro Channels.

Off-Frequency .......... ± 12 VDC output when subcarrier is off-frequency by more than 500 Hz.

Carrier Alarm .......... Relay contact closure when subcarrier is below muting level.

Modulation Alarm .......... Relay contact closure when modulation drops below 10% for more than 30 seconds.

Remote Meter Panel .......... Barrier strip terminals.

SUBCARRIER MEASUREMENTS

*Frequency Response:

SAP Channel .......... 30 Hz to 10 kHz, ± 0.5 dB

Pro Channel .......... 30 Hz to 3 kHz, ± 10 dB

*Distortion .......... 0.5%

*Signal-to-noise Ratio:

SAP Channel .......... 60 dB, de-emphasized

Pro Channel .......... 85 dB, with dbx decoding

*Crosstalk:

Stereo to SAP Channel .......... 60 dB

Stereo to Pro Channel .......... 60 dB

SAP to Stereo .......... 66 dB

Pro Channel to Stereo .......... 66 dB

*Measurements taken using wideband mode.

MECHANICAL & ENVIRONMENTAL

Input Power .......... 115/230 ± 10% VAC, 50 to 400 Hz, 30 watts max.

Operating Temperature .......... 0° to 50°C (32° to 122°F)

Size .......... 5½” (13.3 cm) High x 19” (48.3 cm) Wide x 14½” (37.5 cm) Deep.

Net Weight .......... Approximately 11 pounds

Shipping Weight .......... Approximately 14 pounds.

ORDERING GUIDE

Model 855 SAP/Pro Modulation Monitor
Option 01 (TFT Part Number 7100-4133) Remote Meter & Flasher Panel
Option 02 (TFT Part Number 7100-4134) Spare Parts Kit
FEATURES
- Tuned to any VHF or UHF Channel
- 250 µvolt Sensitivity
- Peak Modulation Flashers
- Off-Air Monitoring of Visual and Aural Carrier Frequencies
- Usable as a 6-Digit Precision Frequency Counter up to 10MHz
- Built-in Aural Modulation Calibrator
- Optional Loss-of-Modulation Alarm

GENERAL DESCRIPTION
The Model 701 Monitor is designed and optimized for off-air monitoring of aural modulation of VHF and UHF TV transmitters without the need of an external RF amplifier. Adequate RF shielding of the circuitry is provided for accurate and reliable operation in a strong RF environment when the instrument is directly connected to the transmitter.

The RF input of the monitor consists of a narrow band coaxial filter, tuned to the desired frequency, and a double-balanced Schottky barrier diode mixer. As a result, intermodulation products generated in the instrument due to undesirable interfering signals are several orders of magnitude lower than in an RF amplifier front end.

The 701 measures visual, aural and intercarrier frequencies and displays the frequency errors on two separate displays. One of the two counters can be selected to display either aural carrier or intercarrier frequency error by a front panel switch. The internal frequency reference is provided by a 5 MHz crystal oscillator housed in a controlled oven which offers excellent long and short term frequency stability. Local oscillators are frequency synthesized and therefore exhibit the same stability as the 5 MHz time base oscillator.

In addition to using a fast attack modulation meter, the 701 includes two peak flashers which display positive and negative peak modulation levels simultaneously. Thumb-wheel switches set the peak modulation level for the flashers in 1.0% increments from 50% to 199% and eliminate the ambiguity of conventional potentiometer type controls. A built-in frequency synthesized modulation calibrator allows the modulation meter and peak flashers to be checked and recalibrated at any time when the front panel pushbutton calibration switch is depressed.

The 701 can also be used as a precision audio demodulator for making Proof-of-Performance measurements of the aural transmitter.

OPTIONS
Option 02
- Frequency and Modulation Alarm. Off-Frequency Alarm is factory set at ±500 Hz. Other settings are available if specified at time of ordering.

Option 03
- SCA output to provide a filtered 39 kHz subcarrier for use in remote control operation.

Option 07
- CCIR format for use in CCIR television systems.

Option 08
- Spare Parts Kit

Model 704 Remote Meter and Flasher Panel
A rack mount panel (5 1/4" × 19") which duplicates the modulation meter and peak modulation flashers of the 701.
### RF INPUT

**Frequency Range**
- Channels 2 through 83
- (54-890 MHz).

**Sensitivity**
- Approx 250 µV; 60 dB automatic gain control range and 40 dB fixed attenuator for monitoring directly off transmitter.

**Image Rejection**
- 60 dB.

**Spurious Response**
- 80 dB.

**Local Oscillator Radiation**
- Conforms to FCC requirements.

**Input Impedance & Connector**
- 75 ohms, BNC.

### AURAL MODULATION METER

**Modulation Range**
- Meter reads full scale for 33.3 kHz deviation. Scale calibrated to 100% at 25 kHz deviation (50 kHz on CCIR Model), 133% at 33.3 kHz deviation. Also includes dB scale (0 dB = 100%).

**Frequency Response**
- ± 0.2 dB, 50 Hz to 15 kHz.

**Accuracy**
- ± 4.0% over entire scale for modulation frequencies between 50 Hz and 15 kHz.

**Meter Characteristics**
- Peak-reading circuit.

**Remote Metering**
- Output provided.

### AURAL MODULATION PEAK INDICATORS

Peak flasher lights indicate plus and minus peaks simultaneously. Peak levels are set by thumbwheel switches, in 1% increments from 50% to 129%.

**Response Time**
- 5 µsec pulse having 1 µsec rise and fall time.

### MODULATION CALIBRATOR

Built-in aural modulation calibrator indicates ± 100% modulation with ± 2% accuracy.

### OUTPUTS

**Output Level**
- Two volts RMS minimum into 600 ohms at 100% modulation and 1 kHz. Distortion is 0.25% at 100% modulation. Residual noise is at least 65 dB below two volts RMS. 75 µsec de-emphasis network provided.

**39 kHz Output**
- One volt RMS into 600 ohms at 10% injection.

---

### AURAL & VISUAL FREQUENCY MEASUREMENT

**Digital Display (LED)**
- Zero to ± 9.99 kHz in 10 or 1 Hz increments from assigned center frequency.

**Accuracy**
- Channels 2 – 13: ± 500 Hz/18 months.
- Channels 14 – 69: ± 500 Hz/6 months.

**Frequency Standard**
- Internal
  - Uses a high precision, oven-controlled, 5 MHz crystal oscillator.
  - One (1) MHz output is provided on the front panel for calibration against WWV or a precision frequency source.

- External
  - 5 MHz input connector on rear panel.

### INTERCARRIER FREQUENCY ERROR MEASUREMENT

**Digital Display (LED)**
- Zero to ± 9.99 kHz in 10 or 1 Hz increments from 4.5 MHz.

**Accuracy**
- ± 100 Hz/5 years.

**Frequency Standard**
- Same as Aural & Visual Frequency Measurement.

### SIX-DIGIT FREQUENCY COUNTER

**Frequency Range & Resolution**
- 10 Hz to 10 MHz: ± 1 Hz

**Input Sensitivity & Impedance**
- 200 mV to 2 volts RMS; 500 k Ohms. Shunted by 15 pF.

**Display Accuracy**
- ± 1 count.

**Time Base Aging Rate**
- 1 x 10^-9/day.

### PHYSICAL & ENVIRONMENTAL

**Size & Weight**
- 19" W x 8¼" H x 15" D; 22 lbs net.
  - (includes rack mounting adapter)

**Power**
- 115/230 VAC. 50–400 Hz, 45 watts maximum.

**Operating Temperature**
- 0° C to 50° C.

### ORDERING GUIDE

The 701 Monitor is fixed-tuned to your specified channel frequency by TFT. When ordering, please specify the channel number, carrier frequencies and frequency offsets, if any.
The FM Modulation Extender from TFT

An accurate modulation monitor with tuneable RF Preselector modules.

- Maximum legal modulation with absolute confidence
- Fast, accurate competitive comparison
- Direct or off-the-air operation

- Improved coverage
- Full FCC compliance

TIME & FREQUENCY TECHNOLOGY INC.
An Accurate Monitor for “No-Risk” High Modulation

To make your FM station worth listening to, you need more than a powerful transmitter. You also need all the modulation you’re legally entitled to. Then you can deliver the “clean” sound your listeners expect, even in fringe areas you might now be losing. That’s why TFT designed the Model 763 FM modulation monitor (FCC Type Approval No. 3-236). It’s so precise, you can modulate your transmitter to the maximum legal limit in absolute confidence. Accuracy is better than 1%.

In addition, you get everything you need for complete proof-of-performance measurements (except distortion) right on the front panel. FCC-approved stereo and SCA monitor add-ons are also available. Plug-in options and accessories for the Model 763 are described on the back cover.

What’s more, the Model 763 costs about the same as other monitors on the market while giving you convenience and flexibility that no other monitor can match. It’s also adaptable to Automatic Transmission System (ATS) use.

RF Preselector Expansion

Although the basic Model 763 is designed for direct transmitter connection, you can use it off-the-air by adding either of two, tuneable RF Preselector modules: Model 764 or Model 765. Both also give you the ability to quickly and accurately compare your modulation with that of competing stations.

Model 764 Preselector

With this unit, you can pre-tune any four FM stations via thumbwheel switches. Then you can precisely monitor, off-the-air, the modulation and carrier frequency error of any one of the four. For convenience, one of them can be your own. Besides reading carrier frequency error, the 6-digit counter in the Model 764 can be also used to read Stereo Pilot Frequency and SCA subcarrier frequency when the Stereo and/or SCA monitors are used with the Model 763.

Model 765 Preselector

The Model 765 has only one set of thumbwheel switches instead of four, and doesn’t have frequency readout. Otherwise, it does the same thing as the Model 764. Carrier frequency can be checked by using a TCXO option and an external counter.

PERFORMANCE FEATURES

Digitally-Settable Peak Flasher

A digitally-settable peak flasher on the Model 763 (a TFT first) displays plus and minus modulation peaks simultaneously. This gives you quick, visual monitoring and catches peak modulation transients that are too fast for the meter. Flasher limits are adjustable from 30% to 150% in 1% increments. Limits are set by thumbwheel switches to eliminate the ambiguities of potentiometer-type controls.

Both the modulation meter and the peak flasher can be checked at any time by a built-in, pushbutton-activated modulation calibrator which uses frequency markers generated by the frequency synthesizers.

Direct AM Measurements

An AM switch on the front panel of the Model 763 allows you to use the instrument for direct measurement of incidental and residual AM on your transmitted carrier. Measurements are read on the modulation meter with the AM switch pushed in.

Built-In Voltmeter

For making complete proof-of-performance measurements, the Model 763 has a built-in 50 dB attenuator, with 10 dB steps. It allows you to make low-level modulation and noise measurements on the modulation meter. In fact, the only additional instrument you need, to perform a complete proof, is a distortion analyzer.

Switchable De-Emphasis

When the Model 763 is being used for AM or low-level noise and modulation measurement, a 75 µsec de-emphasis circuit can be switched into the meter circuit (other time constants available on request). This is done by pushing the S/N switch on the Model 763 front panel.
Plug-In-Options
A choice of four options on separate, plug-in pc boards increases the versatility of the Model 763. These options, which can be added at any time, include: Carrier Power Alarms (either +5% and -10% or +10% and -20%), Modulation Level Alarm, and Balanced Audio Output or BCD output from the frequency counter in the Model 765.

Accessories
Accessories for the Model 763 include a Remote Meter and Peak Flasher Panel, Model 704F. It duplicates the meter and peak flashers at remote locations and comes with 50 feet of cable. A WWV Receiver, Model 735, is also available for frequency calibration of the Model 764 Preselector against the standard NBS signals.
The Model 724A, when combined with the Model 763, meets or exceeds all stereo monitoring and proof-of-performance measurement requirements (except distortion) specified by the FCC. When an SCA subcarrier is also used, a TFT Model 730A SCA monitor (see facing page) can be added to the Model 763.

**Complete Measurement Capability**

With the Model 724A, you can make complete measurements of right channel modulation, left channel modulation, channel separation, cross talk between main and sub-channels, L+R, L–R, 38 kHz carrier suppression and 19 kHz injection level. These measurements are selected by front-panel pushbuttons, and are read on the right hand Modulation/Test Meter. The front panel also includes a precision, 50 dB attenuator in 10 dB steps for measuring low level signals. It has six pushbutton-selectable ranges. In addition, the Model 724A has computer-designed filters in the measuring circuitry to ensure highly accurate separation and crosstalk measurements.

**PLL Demodulator**

The Model 724A provides superior separation measurements by using a phase-locked loop (PLL) to regenerate the 38 kHz suppressed carrier from the 19 kHz pilot carrier. This technique ensures precise accuracy and long-term stability for the phase relationship between the two signals, and eliminates the need for phase alignments of the two signals when accurate separation measurements are to be made.

**Simultaneous L and R Monitoring**

Two separate meters on the Model 724A permit simultaneous monitoring of left and right channel modulation. Total modulation is read on the Model 763 meter.

**Frequency Display**

The pilot carrier frequency of the Model 724A can be measured by the 6-digit counter on the Model 764 Preselector (where it's used with the baseband monitor). Accuracy and resolution is 0.1 Hz. Frequency can also be measured by connecting an external frequency counter to an output on the rear panel of the Model 724A.

**Remote Metering**

Remote metering outputs are available at the rear panel of the Model 724A for use with the Model 704C remote panel accessory. The 704C duplicates the left and right modulation meters, and comes with 50 feet of cable.
The TFT Model 730A Monitor is designed for use with the Model 763 to provide complete measurement of SCA transmission characteristics, and to meet all proof-of-performance requirements (except distortion).

Complete Measurement Capability

With the Model 730A, you can make complete, accurate measurements of injection level, modulation, S/N ratio and crosstalk. Measurement modes are selected by front panel pushbuttons. For added convenience, a 50 dB pushbutton attenuator is included, similar to that used on the Model 763 baseband monitor. In addition, for true proof-of-performance measurements (at the transmitter), a wideband input is provided. It allows you to make unrestricted distortion and frequency response measurements. Measurement accuracy is ensured by up-convecting the baseband signal to 10.7 MHz and extracting the SCA sub-channel through precision crystal filters. Pushbutton selection of either ±4 kHz or ±6 kHz as the frequency deviation to represent 100% modulation is a standard feature of the Model 730A.

Digitally-Settable Peak Flashers

In addition to a peak reading modulation meter, which can be switched to display either plus or minus modulation peaks, the Model 730A also has two digitally-settable peak flashers. They measure and display the plus and minus peak modulation of the SCA signal simultaneously. Limits are set by front panel thumbwheel switches, from 50% to 129% in 1% increments. Flasher and meter accuracy can be checked at any time using an internal, precision calibration signal. The signal source is activated by a front panel pushbutton. Calibration adjustments, if needed, can be made on the front panel of the Model 730A.

Frequency Display

When the Model 764 RF Preselector is used with the Model 763 baseband monitor, its 6-digit counter can be used to measure, and digitally display, the SCA sub-carrier frequency which is extracted from a filter in the Model 730A. An output connector is also provided on the rear panel of the Model 730A for connection to an external frequency counter.

Choice of Carrier Frequencies

The Model 730A can be furnished for monitoring either the 47 kHz or the 67 kHz sub-carrier frequency, both frequencies, or other customer specified frequencies. When two carrier frequencies are included, selection is made by a front panel pushbutton.

Remote Monitoring

Outputs are provided on the rear panel of the Model 730A for remote display of the meter and peak flashers. This is done using the same Model 704B Remote Panel used for the Model 763 baseband monitor.
SPECIFICATIONS

**Model 763 FM Modulation Monitor**

**RF INPUT**
- Frequency Range: 88 to 108 MHz
- RF Input Voltage Range: 1 to 10 volts rms
- Input Impedance: 50 ohms nominal

**MODULATION METER**
- Deviation for 100% indications: ±75 kHz
- Meter Range: 0 to 133%
- Attenuator Range: 0 to –50 dB in 10-dB steps
- Accuracy (5-kHz tone): ±2% at all modulation levels
- Frequency Response: ±0.1 dB typical ±0.25 dB max.
  from 100 Hz to 75 kHz.
  ±0.25 dB typical ±0.4 dB max.
  from 50 Hz to 100 kHz.
- Characteristics: Quasi-peak reading circuit, scale
  and ballistics conform to FCC requirements.
- Remote Output: Suitable for driving two Model
  704F Remote Readout Meter Panels.

**PEAK MODULATION INDICATORS**
- Deviation for 100% indication: ±75 kHz
- Peak Level: Set by a front-panel three digit
  thumbwheel switch in 1% steps
  from 50% to 150% on both positive and negative peaks.
- Accuracy (5-kHz tone): ±2% at 100% modulation
- Frequency Response: ±2% from 50 Hz to 75 kHz
  ±4% from 50 Hz to 100 kHz.
- Response Time Accuracy
  (1 cycle of 50 kHz).
- Remote Output: Suitable for driving two Model 704F
  Remote Readout Panels.

**MODULATION CALIBRATOR**
- Built in for calibration of modulation meter and peak
  flashers from the front panel.

**MEASUREMENT OF RESIDUAL AM**
- Range: 0 to 70 dB
- Accuracy (at –30 dB): ±1 dB

**AUDIO AND COMPOSITE OUTPUTS (at 100% modulation)**
- Composite Output: 5 volts rms into 5000 ohms
  (Audio Output with 75-µs de-emphasis).
  5 volts rms into 5000 ohms
  at 400 Hz.
- Signal-to-Noise Ratio
  (400 Hz with de-emphasis): 75 dB
- Harmonic Distortion: 0.1% max.
- Intermodulation Distortion: 0.1% max. per SMPTE standard
- Frequency Response
  (W/O de-emphasis): ±0.25 dB from 50 Hz to 75 kHz
- Audio Monitor Output: 0 dBm into 600 ohms
- Stereo Monitor Output: 1 volt rms into 600 ohms
- SCA Monitor Output: 1 volt rms into 600 ohms
- CARRIER-FAIL ALARM: Relay drive output capable of
  sinking 50 mA at 30 V DC when RF carrier drops below 50% of
  nominal.

**PRESELECTOR INPUT**
- Direct input to discriminator for
  use with Model 764 or Model 765
  FM Preselector.
- Frequency: 700 kHz
- Input Level: 100 mV rms for full limiting

**OPTIONAL FEATURES**
- Carrier Power Alarm: Two relay-drive outputs, one for
carrier level changes of ±5% and
the other for ±10%. Each output is
capable of sinking 50 mA at 30V
DC.
- Modulation Level Alarm: An output capable of sinking 50 mA
at 30 V DC when composite signal
drops below 30% modulation for
a period of time between 2 seconds and
1 minute, internally adjustable.
- Balanced Audio Output Level: 0 dBm into 600 ohms
- Frequency Response: ±1 dB from 50 Hz to 50 kHz

**PHYSICAL AND ENVIRONMENTAL SPECIFICATIONS**
- Power: 117/230 VAC ±10% 50 to 400 Hz.
- Operating Temperature: 0°C to 50°C
- Dimensions: 15”W x 5 ½”H x 14”D
- Weight: 14 lbs.
- Cabinet: Rack mountable
- *Because of the AGC circuitry, Carrier Power Alarm applies only when
Model 763 is used without a preselector.

**FCC TYPE APPROVAL NUMBER**
Model 763: 3-236

Model 764 & Model 765 FM RF Preselectors
Specifications Common to Both 764 and 765

**Frequency Range**: 88-108 MHz
- Input Sensitivity
  - for 56 dB S/N: 100 µV
  - for 66 dB S/N: 1000 µV
- Audio Frequency Response
  - 50 Hz-75 kHz: ±0.5 dB
  - 75 kHz-88 kHz: ±0.5 dB
  - 88 kHz-108 kHz: ±3 dB
- IF Selectivity: 3 dB BW: 375 kHz (nominal)
  40 dB BW: 800 kHz (max)
- Input Impedance: 75 ohm, nominal
- Tuning: 4 Digit Thumbwheel
- AGC Range: 60 dB
- Manual Gain Control: 20 dB

**Specifications Pertaining to Model 764 Only**
- Frequency Readout: 6 Digits
- Main Carrier Frequency
  - Error
    - Range: ±199.999 kHz
    - Resolution: 1 Hz
    - Accuracy: ±100 Hz/year
  - Stereo Pilot Frequency: 19,000 kHz
    - Resolution: 0.1 Hz
    - Accuracy: ±0.1 Hz 5/years
  - SCA Subcarrier Frequency: 23-100 kHz
    - Resolution: 1 Hz
    - Accuracy: ±1 Hz

**FCC TYPE CERTIFIED**
Model 724A Stereo Monitor

**INPUTS**
- Composite: 500 mV RMS, 600 ohms unbalanced
- Input Connector: BNC

**MODULATION MEASUREMENTS**
- Meter Range: 0 to 133%, 0 to 40%, and dB scale
- Meter Characteristics: 4½” (11.43 cm) illuminated scale,
scale and ballistics conform to FCC requirements.
- Attenuator Range: 50 dB in 10 dB steps, pushbutton
  selectable
- Frequency Response
  - Left, Right and (L+R)
  - Channels: ±4% (±0.35 dB, 50 Hz to 15 kHz)
  - (L–R) Channel: ±4% (±0.35 dB), 23 kHz to 53 kHz
  - Accuracy: ±4% over entire range

**MODULATION CALIBRATION**
- Deviation: 100% modulation equals ±75 kHz
  deviation.
- Calibrator: Calibration signal from baseband
  monitor is used for calibration of meter.
INTERNAL SEPARATION AND CROSSTALK
Separation
L-to-R and R-to-L .......... 45 dB min., 55 dB typical, 50 Hz to 15 kHz
Crossstalk
(L+R) to (L-R) or
(L-R) to (L+R) .......... 60 dB min.
SCA to (L+R) or
SCA to (L-R) .......... 66 dB min. 10% SCA injection
PILOT CARRIER MEASUREMENT
Level Accuracy .......... ±0.5% from 6% to 12% injection
Frequency Measurement . Measured by the frequency counter in the Model 764 to an accuracy and resolution of ±0.1 Hz or can be measured by an external frequency counter.

OUTPUTS
Audio, (with de-emphasis)
Left and Right .......... 1V RMS, 600 ohms unbalanced at 100% modulation, ±0.35 dB, 50 Hz to 15 kHz. Distortion; less than 0.25%, Signal-to-noise: 60 dB below 100% modulation.
Audio (without de-emphasis)
Left and Right .......... 1V RMS, 600 ohms unbalanced at 100% modulation, ±0.35 dB, 50 Hz to 15 kHz.
Pilot Carrier (19 kHz) .......... 200 mV RMS, 50 ohms
Composite .......... 1V RMS, 10K ohms at 100% modulation
Remote Meter .......... For Model 704C Remote Meter Panel.
Connectors .......... BNC
Meter Output .......... Approx. 10V peak-to-peak equals 100%

INPUT POWER
24 VAC supplied by the baseband monitor

FCC TYPE APPROVAL NUMBER
Model 724A .......... 3-237
MODEL 730A SCA Monitor

INPUTS
Composite .......... 1V, 600 ohms unbalanced.
Wideband .......... 1V, 600 ohms unbalanced.
Connectors .......... BNC

MODULATION MEASUREMENTS
Meter Range .......... 0 to 13%, 0 to 40%, and dB scale
Meter Characteristics .......... 4% (11.43 cm) illuminated scale
Scale and ballistics conform to FCC requirements.

Attenuator Range .......... 50 dB in 10 dB steps, pushbutton selectable.

Main Channel Modulation Measurement
100% Modulation .......... ±75 kHz
Modulation Accuracy .......... ±4%
Out-of-Band Rejection (50 kHz to 15 kHz) .......... 56 dB
SCA Subchannel Modulation Measurement
100% Modulation .......... ±4 kHz or ±6 kHz, pushbutton selectable
Modulation Accuracy (100% Modulation, 1 kHz tone) .......... ±2%
Frequency Response, Composite input .......... ±1 dB, 20 Hz to 6 kHz
Frequency Response, Wideband input .......... ±0.5 dB, 20 Hz to 7.5 kHz

INTERNAL CROSSTALK
Main to SCA .......... 66 dB
Stereo to SCA .......... 66 dB
SCA to main .......... 66 dB

SCA PEAK MODULATION INDICATORS
Variable Peak Indicators .......... Positive and negative peak modulation LED flashers. Peak limit set by thumbwheel switches in 1% increments from 50% to 129%.
Accuracy .......... ±10%
Response Time .......... 1 cycle at 2 kHz

SCA MODULATION AND INJECTION LEVEL CALIBRATOR
Built-in modulation and injection level calibrator for calibrating modulation meter and the peak flashers from the front panel.

SUBCARRIER FREQUENCY MEASUREMENT
Sub-Carrier #1 .......... 67 kHz (standard)
Sub-Carrier #2 .......... 41 kHz (optional)
Frequency Measurement .......... Measured by the frequency counter in the Model 764 or by an external frequency counter.

OUTPUTS
SCA Subcarrier .......... 500 mV, into 5K ohms
SCA Subcarrier alarm .......... Contact closure when subcarrier is below muting level.
Audio (with de-emphasis) .......... 2V RMS, 600 ohms unbalanced at 100% modulation. De-emphasis internally selectable to 75 or 150 μsec.
Distortion .......... Wideband input: 0.5% at ±6 kHz
Composit input: 1% at ±4 kHz, 1.5% at ±6 kHz
Signal-to-Noise .......... Composite or wideband input, 66 dB
Audio (without de-emphasis) .......... 2V RMS, 600 ohms unbalanced at 100% modulation.
Remote Meter and Flashes .......... For Model 704B Remote Meter and Flasher Panel.
Connectors .......... BNC
INPUT POWER
115/230 ±10% VAC, 50 to 400 Hz, 25 watts max.

FCC TYPE APPROVAL NUMBER
Model 730A .......... 3-238

Models 724A and 730A

PHYSICAL AND ENVIRONMENTAL
Operating Temperature .......... 0° to 50° C (32° F to 122° F)
Size .......... 7" (17.78 cm) high x 19" (48.26 cm) wide x 17" (43.18 cm) deep
Weight .......... approx. 15 pounds (6.8 kg)

Specifications subject to change without notice.
TFT: Quality and Innovation

Since its start in 1971, TFT has become the major supplier of frequency and modulation monitors for AM, FM, FM Stereo, SCA and VHF/UHF TV. This success has come about because TFT builds beyond the FCC requirements to provide equipment that always leads the state of the art in accuracy, convenience and reliability. Among other things, TFT has pioneered such broadcast monitoring advances as frequency synthesizers, direct NBS calibration, remote monitoring without RF amplifiers, phase-lock-loop technology, digital frequency readout and tuneable preselectors.

TFT also manufactures the 7600 Series Digital Remote Control System, first modular all-digital system for remote control of AM, FM and TV transmitters.

Completing the TFT product family is a line of Emergency Broadcast equipment which is currently being used by about 50 percent of the EBS-equipped radio and TV stations in the United States.

In fact, about 75 percent of the radio and TV stations in the U.S. plus a large and growing number of stations in Canada, Europe, Latin America and Africa, use a TFT instrument for monitoring, controlling or testing.

For more information about, and a demonstration of, TFT monitors and/or other TFT products, contact your local sales representative. Or contact TFT in Santa Clara, California. All TFT products carry a one-year warranty on workmanship and materials.
## FM PRODUCTS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>753</td>
<td>FM Modulation Monitor (Specify Frequency)</td>
<td>$1,210.00</td>
</tr>
<tr>
<td>Option 01</td>
<td>Balanced Audio Output</td>
<td>29.00</td>
</tr>
<tr>
<td>Option 02</td>
<td>Carrier Power Alarm, +5% - 10% (does not work with preselector)</td>
<td>105.00</td>
</tr>
<tr>
<td>Option 04</td>
<td>Absence-of-Modulation Alarm</td>
<td>140.00</td>
</tr>
<tr>
<td>Option 06</td>
<td>230 VAC</td>
<td>N/C</td>
</tr>
<tr>
<td>Option 07</td>
<td>Spare Parts Kit</td>
<td>165.00</td>
</tr>
<tr>
<td>764</td>
<td>FM Preselctor with Frequency Readout</td>
<td>$1,530.00</td>
</tr>
<tr>
<td>Option 01</td>
<td>BCD Output</td>
<td>160.00</td>
</tr>
<tr>
<td>Option 02</td>
<td>Frequency Alarm (±2 kHz)</td>
<td>105.00</td>
</tr>
<tr>
<td>Option 03</td>
<td>Spare Parts Kit</td>
<td>185.00</td>
</tr>
<tr>
<td>765</td>
<td>FM Preselctor Modulation Only</td>
<td>895.00</td>
</tr>
<tr>
<td>Option 01</td>
<td>TCXO Time Base</td>
<td>140.00</td>
</tr>
<tr>
<td>Option 02</td>
<td>Spare Parts Kit</td>
<td>135.00</td>
</tr>
<tr>
<td>704F</td>
<td>Remote Meter and Peak Flasher Panel</td>
<td>275.00</td>
</tr>
<tr>
<td>724A</td>
<td>STEREO MONITOR</td>
<td>1,580.00</td>
</tr>
<tr>
<td>Option 01</td>
<td>Spare Parts Kit</td>
<td>160.00</td>
</tr>
<tr>
<td>704C</td>
<td>Remote Meter Panel</td>
<td>390.00</td>
</tr>
<tr>
<td>730A</td>
<td>SCA MONITOR, 67 kHz</td>
<td>$1,610.00</td>
</tr>
<tr>
<td>Option 01</td>
<td>SCA Channel (41 kHz)</td>
<td>105.00</td>
</tr>
<tr>
<td>Option 02</td>
<td>Spare Parts Kit</td>
<td>135.00</td>
</tr>
<tr>
<td>704B</td>
<td>Remote Meter Panel</td>
<td>275.00</td>
</tr>
</tbody>
</table>

## EBS PRODUCTS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>760-1A</td>
<td>AM Receiver/Encoder/Decoder</td>
<td>$ 598.00</td>
</tr>
<tr>
<td>760-1B</td>
<td>Single Channel FM Receiver/Encoder/Decoder</td>
<td>598.00</td>
</tr>
<tr>
<td>760-1C</td>
<td>Dual Channel FM Receiver/Encoder/Decoder</td>
<td>620.00</td>
</tr>
<tr>
<td>760-3</td>
<td>Encoder/Decoder</td>
<td>395.00</td>
</tr>
<tr>
<td>760-2A</td>
<td>AM Receiver/Decoder</td>
<td>340.00</td>
</tr>
<tr>
<td>760-5A</td>
<td>Single Channel FM Receiver/Decoder</td>
<td>340.00</td>
</tr>
<tr>
<td>760-5B</td>
<td>Dual Channel FM Receiver/Decoder</td>
<td>385.00</td>
</tr>
<tr>
<td>761-1A</td>
<td>AM Receiver/Decoder (Desk Top)</td>
<td>460.00</td>
</tr>
<tr>
<td>761-1B</td>
<td>Single Channel FM Receiver/Decoder</td>
<td>400.00</td>
</tr>
<tr>
<td>761-5B</td>
<td>Dual Channel FM Receiver/Decoder (Desk Top)</td>
<td>470.00</td>
</tr>
</tbody>
</table>

## TERMS OF SALE

All shipments are F.O.B. Santa Clara, California. Terms are net 30 days to customers who have a satisfactory established line of credit with us. Others should arrange with the factory for payment at the time of shipment.

**WARRANTY**

Time and Frequency Technology, Inc. warrants each of the instruments of its manufacture to be produced to meet the specifications delivered to the BUYER, and to be free from defect in material and workmanship; and will repair or replace at its expense, for a period of one year from the date of delivery of equipment, any parts which are defective from faulty material or workmanship. Equipment, accessories, tubes and batteries not manufactured by T&F are subject to only such warranties as those issued by the manufacturer.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charge prepaid by the BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of the BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER prior to such returns. Upon examination by the factory, if the instrument is found to be defective, the unit will be replaced and returned to the SELLER, with transportation charges prepaid by the SELLER.

Transportation charges for instruments found to be defective within the first thirty (30) days of the warranty period will be paid both ways by the SELLER.

Transportation charges for warranty returns and repair costs, wherein failure is found not to be the fault of the SELLER, shall be paid both ways by the SELLER.

This warranty does not apply to instruments which, in the opinion of the SELLER, have been altered or misused. No other warranty is expressed or implied. We are not liable for consequential damages.
# Price Schedule
## Broadcast Monitoring Equipment

<table>
<thead>
<tr>
<th>TV Products</th>
<th>May 1, 1978</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL 701</strong></td>
<td></td>
</tr>
<tr>
<td>TV Frequency &amp; Aural Modulation</td>
<td>$5,590.00</td>
</tr>
<tr>
<td>Monitor, Rack Mount</td>
<td></td>
</tr>
<tr>
<td>Specify Channel &amp; Offset</td>
<td></td>
</tr>
<tr>
<td>Option 02: Alarm (frequency and</td>
<td>215.00</td>
</tr>
<tr>
<td>modulation)</td>
<td></td>
</tr>
<tr>
<td>Option 03: SCA Output</td>
<td>215.00</td>
</tr>
<tr>
<td>Option 04: AGC Meter (visual/aural</td>
<td>170.00</td>
</tr>
<tr>
<td>carrier level)</td>
<td></td>
</tr>
<tr>
<td>Option 06: Automatic Logging</td>
<td>160.00</td>
</tr>
<tr>
<td>Output (BCD)</td>
<td></td>
</tr>
<tr>
<td>Option 07: CCIR Format</td>
<td>395.00</td>
</tr>
<tr>
<td>Option 08: Spare Parts Kit</td>
<td>560.00</td>
</tr>
<tr>
<td><strong>MODEL 702</strong></td>
<td>$2,650.00</td>
</tr>
<tr>
<td>TV Aural Modulation Monitor</td>
<td></td>
</tr>
<tr>
<td>Rack Mount</td>
<td></td>
</tr>
<tr>
<td>Specify Channel &amp; Offset</td>
<td></td>
</tr>
<tr>
<td>Option 02: Alarm (modulation)</td>
<td>130.00</td>
</tr>
<tr>
<td>Option 03: SCA Output</td>
<td>215.00</td>
</tr>
<tr>
<td>Option 04: AGC Meter (visual/aural</td>
<td>170.00</td>
</tr>
<tr>
<td>carrier level)</td>
<td></td>
</tr>
<tr>
<td>Option 05: Spare Parts Kit</td>
<td>265.00</td>
</tr>
<tr>
<td><strong>MODEL 704</strong></td>
<td></td>
</tr>
<tr>
<td>Remote Meter and Peak Flasher</td>
<td>275.00</td>
</tr>
<tr>
<td>Panel</td>
<td></td>
</tr>
<tr>
<td><strong>MODEL 725D</strong></td>
<td></td>
</tr>
<tr>
<td>Automatic Logging Adapter (D to A</td>
<td>955.00</td>
</tr>
<tr>
<td>Converters)</td>
<td></td>
</tr>
</tbody>
</table>

## AM Products

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>753</td>
<td>AM Modulation Monitor</td>
<td>1,040.00</td>
</tr>
<tr>
<td>Option 01</td>
<td>Balanced Audio Output</td>
<td>29.00</td>
</tr>
<tr>
<td>Option 02</td>
<td>Carrier Power Alarm (does not work with preselector)</td>
<td>105.00</td>
</tr>
<tr>
<td>Option 03</td>
<td>10 kHz Whistle Filter</td>
<td>105.00</td>
</tr>
<tr>
<td>Option 04</td>
<td>30 Hz Telemetry Lowpass</td>
<td>48.00</td>
</tr>
<tr>
<td>Option 05</td>
<td>Absence-of-Modulation Alarm</td>
<td>140.00</td>
</tr>
<tr>
<td>Option 06</td>
<td>230 VAC</td>
<td>N/C</td>
</tr>
<tr>
<td>Option 07</td>
<td>Spare Parts Kit</td>
<td>135.00</td>
</tr>
<tr>
<td>754</td>
<td>AM RF Preselector with Frequency Readout</td>
<td>$1,420.00</td>
</tr>
<tr>
<td>Option 01</td>
<td>Narrow Band Filter</td>
<td>235.00</td>
</tr>
<tr>
<td>Option 02</td>
<td>BCD Output</td>
<td>160.00</td>
</tr>
<tr>
<td>Option 03</td>
<td>Frequency Alarm (± 20 Hz)</td>
<td>105.00</td>
</tr>
<tr>
<td>Option 04</td>
<td>Spare Parts Kit</td>
<td>160.00</td>
</tr>
<tr>
<td>755</td>
<td>AM RF Preselector (Modulation Only)</td>
<td>785.00</td>
</tr>
<tr>
<td>Option 01</td>
<td>Narrow Band Filter</td>
<td>235.00</td>
</tr>
<tr>
<td>Option 02</td>
<td>TCXO Time Base</td>
<td>140.00</td>
</tr>
<tr>
<td>Option 03</td>
<td>Spare Parts Kit</td>
<td>109.00</td>
</tr>
<tr>
<td>704E</td>
<td>Remote Meter and Peak Flashers</td>
<td>275.00</td>
</tr>
</tbody>
</table>
# PRICE SCHEDULE

## REMOTE CONTROL EQUIPMENT

**May 1, 1978**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL 7601</td>
<td>10-channel Raise and Lower functions plus 10 channels of digital telemetry, consisting of a control terminal and a remote terminal.</td>
<td>To provide economical digital remote control to AM &amp; FM stations (up to a maximum of 10 channels)</td>
<td>$1,995.00</td>
</tr>
<tr>
<td>Option 01 Sub-carrier (SCA) Detector, for FM use 67 kHz. Other frequencies from 26 kHz to 185 kHz available. Mounts within 7601 Control or Remote Terminal.</td>
<td>To provide demodulation of the SCA subcarrier (specify frequency)</td>
<td>$150.00</td>
<td></td>
</tr>
<tr>
<td>Option 02 Sub-carrier (SCA) Generator for FM use 67 kHz. Other frequencies from 26 kHz to 185 kHz available. Mounts within 7601 Control or Remote Terminal.</td>
<td>To generate the SCA subcarrier (specify frequency)</td>
<td>$150.00</td>
<td></td>
</tr>
<tr>
<td>Option 03 Extender Cable Kit for Remote Terminal.</td>
<td>A kit to provide rear wiring extension such that the 7601 can be removed from the rack for service without having to disconnect wirings to and from the transmitter and sensors. Three foot cable.</td>
<td>$25.00</td>
<td></td>
</tr>
<tr>
<td>Option 04 Spare Parts Kit.</td>
<td>To provide spare parts such as relays, and I.C’s for emergency repair</td>
<td>$320.00</td>
<td></td>
</tr>
<tr>
<td>Option 05 10 channel Status Light</td>
<td>To provide 10 channels of independent status light indicators at both the control and remote terminals.</td>
<td>$495.00</td>
<td></td>
</tr>
<tr>
<td>MODEL 7601-C</td>
<td>Control portion only of 7601 system</td>
<td>To provide an alternate control location for 7601</td>
<td>$860.00</td>
</tr>
<tr>
<td>Option 01 Dual control modification</td>
<td>Modifies control unit to permit assignable control units. (See Application Bulletin 77-01 12-14-77)</td>
<td>$200.00</td>
<td></td>
</tr>
<tr>
<td>MODEL 7601R</td>
<td>Remote portion only of 7601 system</td>
<td>For use at each additional remote site (up to 16)</td>
<td>$1,220.00</td>
</tr>
<tr>
<td>MODEL 7610</td>
<td>10 channel RAISE/LOWER Plus 10 channel Telemetry digital remote control system. Expandable by adding Model 7615, 7620, 7630 to a 110-channel system</td>
<td>To provide digital remote control systems for medium and large size AM,FM &amp; TV stations. Also suitable for controlling multi-site operations.</td>
<td>$2,795.00</td>
</tr>
<tr>
<td>Option 01 Sub-carrier (SCA) Detector; for TV application, specify 39 kHz, for FM 67 kHz. Other frequencies 26 kHz to 185 kHz available. Mounts within 7610 Control or Remote Terminal.</td>
<td>To provide demodulation of the SCA subcarrier (specify frequency)</td>
<td>$150.00</td>
<td></td>
</tr>
<tr>
<td>Option 02 Sub-carrier (SCA) Generator; for TV use, specify 39 kHz; for FM, 67 kHz. Other frequencies 26 kHz to 185 kHz available. Mounts within 7610 Control or Remote terminal</td>
<td>To generate the SCA sub-carrier (specify frequency)</td>
<td>$150.00</td>
<td></td>
</tr>
<tr>
<td>Option 03 BCD parallel data inputs (for the Remote Terminal)</td>
<td>To provide two channels of parallel BCD inputs to accept external digital data such as the readings from a digital frequency monitor or frequency counter.</td>
<td>$150.00</td>
<td></td>
</tr>
<tr>
<td>Option 04 Parallel BCD Data Output Cable Kit (for 7610C Control Terminal)</td>
<td>A cable kit to provide external control of channel selection, RAISE/LOWER function and parallel BCD output of the channel identification and DVM reading</td>
<td>$175.00</td>
<td></td>
</tr>
</tbody>
</table>
### Remote Control Interfacing Accessories

<table>
<thead>
<tr>
<th>MODEL</th>
<th>Description</th>
<th>Application</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSU-01</td>
<td>Fail-Safe Unit for TV application</td>
<td>To provide full compliance with FCC Rules by monitoring 4 critical parameters: aural plate voltage, aural plate current, aural power and visual power.</td>
<td>$475.00</td>
</tr>
<tr>
<td>ADS-01</td>
<td>Alternate Data Path Selector</td>
<td>Switch from SCA to phone line when invalid data is detected from either the Control or the Remote terminal. Both local and remote units are included.</td>
<td>$900.00</td>
</tr>
<tr>
<td>CSA-01</td>
<td>Chopper Amplifier</td>
<td>To provide isolation from a floating circuit to a grounded circuit. DC gain is also provided.</td>
<td>$145.00</td>
</tr>
<tr>
<td>PLC-01</td>
<td>Power-to-Linear Converter</td>
<td>To linearize power readings from log scale to linear scale.</td>
<td>$245.00</td>
</tr>
<tr>
<td>TLK-01</td>
<td>Tower Light Monitor</td>
<td>To monitor AC line current</td>
<td>$65.00</td>
</tr>
<tr>
<td>LVK-01</td>
<td>Line Voltage Monitor</td>
<td>To monitor AC line voltage</td>
<td>$50.00</td>
</tr>
<tr>
<td>PVK-01</td>
<td>Plate Voltage Monitor</td>
<td>To monitor plate voltage up to 20 kv</td>
<td>$65.00</td>
</tr>
<tr>
<td>TSK-01</td>
<td>Temperature Sensing Kit</td>
<td>To monitor temperature of air or components</td>
<td>$95.00</td>
</tr>
<tr>
<td>MBB-01</td>
<td>Isolation amplifier (High Voltage)</td>
<td>For monitoring voltage and current at 10kv above ground and translate reading in reference to ground voltage to suit the input of the Remote Terminals</td>
<td>$95.00</td>
</tr>
<tr>
<td>RFK-01</td>
<td>AM RF Transmission Line Voltage Sampling Kit</td>
<td>For monitoring RF voltages and translating to DC output voltage. (later)</td>
<td></td>
</tr>
<tr>
<td>RFK-02</td>
<td>RF Transmission Line Voltage Sampling Kit for 3 1/8&quot; line (FM &amp; TV)</td>
<td>For monitoring RF Voltages and translating to D.C. output voltage</td>
<td>$45.00</td>
</tr>
<tr>
<td>RFK-03</td>
<td>RF Transmission Line Voltage Sampling Kit for 1 5/8&quot; line (FM &amp; TV)</td>
<td>For monitoring RF Voltages and translating to D.C. output voltage</td>
<td>$45.00</td>
</tr>
</tbody>
</table>

### Terms of Sale

All shipments are made F.O.B. Santa Clara, California. Terms are net 30 days to customers who have a satisfactory established line of credit with us. Others should arrange with the factory for payment at the time of shipment.

### Warranty

Time and Frequency Technology, Inc. warrants each of the instruments of its manufacture to be produced to meet the specifications delivered to the BUYER; and to be free from defects in material and workmanship; and will repair or replace at its expense, for a period of one year from the date of delivery of equipment, any parts which are defective from faulty material or workmanship. Equipment, accessories, tubes and batteries not manufactured by TFT are subject to only such warranties as those listed by the manufacturer.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charge prepaid by BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER, prior to such returns. Upon examination by the factory, if the instrument is found to be defective, the unit will be repaired and returned to the BUYER, with transportation charge prepaid by SELLER.

Transportation charges for instruments found to be defective within the first thirty (30) days of the warranty period will be paid both ways by the SELLER.

Transportation charge for warranty returns and repair costs, wherein failure is found not to be the fault of the SELLER, shall be paid both ways by the BUYER.

This warranty does not apply to instruments which, in the opinion of the SELLER, have been altered or misused. No other warranty is expressed or implied. We are not liable for consequential damages.

**TFT**

**Time and Frequency Technology, Inc.**

3090 Oakmead Village Dr., Santa Clara, CA. 95051 (408)246-6365 TWX 910-338-0584
MODEL 701 TV FREQUENCY AND MODEL 702 AURAL MODULATION MONITORS

UHF and VHF OFF-THE-AIR MONITORING FREQUENCIES and AURAL MODULATION

FEATURES (Model 701 and Model 702)

- Covers all UHF and VHF Channels
- Off Air Monitoring of Aural Modulation
- 250 µV Sensitivity
- Digitally Set Peak Modulation Flashers
- Built-in Aural Modulation Calibrator
- Optional Over-Modulation Alarm
- FCC-Type Approved
- Portable or Rack Mount

FEATURES (Model 701 Only)

- Off-the-air Monitoring of Visual and Aural Carrier Frequencies
- Usable as a 6-Digit Precision Frequency Counter up to 10 MHz
- Optional Off-Frequency Alarm

GENERAL DESCRIPTION

Both the Model 701 and Model 702 are state-of-the-art TV Monitors designed and optimized for off air monitoring of aural modulation in UHF and VHF TV transmitters without the need of an external RF amplifier. Adequate RF shielding of the circuitry is provided in the Model 701 and 702 for accurate and reliable operation in a strong RF environment when the instrument is directly connected to the transmitter through an RF attenuator supplied by TFT.

The RF input of the monitors consists of a narrow band coaxial filter tuned to the desired frequency and a double-balanced Schottky barrier diode mixer. As a result, intermodulation products generated in the instrument due to undesirable interfering signals are several orders of magnitudes lower than that in an RF amplifier front end.

Both the Model 701 and 702 have, in addition to a fast attack modulation meter, two peak flashers which measure and display positive and negative peak modulation simultaneously. The peak flashers can be calibrated from 50% to 129% in one percent increments. The digital thumbwheel switches that set the peak modulation level for the flashers eliminates the ambiguity of conventional potentiometer-type controls. Built-in frequency synthesizer-type modulation calibrator allows modulation meter and peak flashers to be checked and recalibrated at any time when the front panel pushbutton calibration switch is depressed.

In addition to serving as an off air modulation monitor for maintaining the highest degree of transmitter modulation and constant loudness in audio level, the Model 701 and 702 can be used as a precision audio demodulator for making proof-of-performance measurements in the aural transmitter.

Model 701 and Model 702 are FCC-type approved carrying FCC-type Approval No. 3-187 and 3-189, respectively.

The Model 701 has all the features as in the Model 702. In addition, it also measures the visual, aural and intercarrier frequencies and displays the frequency errors on two separate frequency error counters. One of the two counters can be selected to display either aural carrier or intercarrier frequency error by a front panel switch. The internal frequency reference is provided by a 5-MHz crystal oscillator housed in a proportionally-controlled oven which offers excellent long and short term frequency stabilities. Local oscillators are frequency synthesized and therefore exhibit the same stabilities as the 5-MHz time base oscillator.

ORDERING INFORMATION

The monitors are fixed tuned to your specified channel frequency in the factory. Please specify the channel number, carrier frequencies, and frequency offsets, if any.
OPTIONS

Option 01 — 19 in. rack monitoring adapter (standard with each instrument)

Option 02 — Over modulation and off frequency alarm which is factory set at ± 500 Hz, other settings available if specified in the order.

Option 03 — SCA output to provide filtered 39-kHz subcarrier for use in remote control operation.

Option 04 — AGC meter to provide relative signal strength when used in off air mode.

Option 05 — Automatic logging output to provide BCD outputs of the frequency counter for Model 725D automatic logging adapter.

Option 06 — CCIR format for use in CCIR television system.

ACCESSORY EQUIPMENT

Model 704 Remote Meter and Flasher Panel, 19” W x 5-1/4” H x 3” D rack monitoring panel that duplicates the modulation meter and peak modulation flashers of the Model 701 and Model 702.

Model 725D Automatic Logging Adapter, 5.6” W x 8” H x 15” D. The instrument is a precision digital-to-analog converter which converts the frequency counter readings in the Model 701 to analog signal outputs. These signals can then be used for data logger that accepts only analog signals.

Model 730B SCA Modulation and Injection Level Monitor, 19” W x 7” H x 17” D. An add-on instrument to Model 701 or Model 702 for monitoring the 39-kHz and 67-kHz subcarrier transmission characteristics and also for proof-of-performance measurements.

Model 725D Automatic Logging Adaptor and Model 701 TV Monitor

U.S. PATENT NO. 3736510
MODEL 701 and 702 SPECIFICATIONS

RF Input
- Frequency range . . . . . . . . Channels 2 through 83 (54 MHz – 890 MHz)
- Sensitivity . . . . . . . . . . . . Approx 250 µV, 60 dB automatic gain control range and 40 dB fixed attenuator for monitoring at transmitter site
- Image rejection . . . . . . . . . . . . -60 dB
- Spurious response . . . . . . . . . . . . -80 dB
- Local oscillator radiation . . . . . . Conforms to FCC rules
- Input impedance . . . . . . . . . . . . 75 ohms
- Input connector . . . . . . . . . . . . BNC

Aural Modulation Meter
- Modulation range . . . . . . . . . . Meter reads full scale on 33.3 kHz deviation. Scale calibrated to 100% at 25 kHz deviation (50 kHz on CCIR Model), 133% at 33.3 kHz deviation. Also includes dB scale (0 dB = 100%).
- Frequency response . . . . . . . . ±0.2 dB, 50 Hz to 15 kHz
- Accuracy . . . . . . . . . . . . . . ±4% over entire scale for modulation frequencies between 50 Hz and 15 kHz
- Meter characteristics . . . . . . . . Peak reading circuit scale and ballistics conform to FCC requirements
- Remote metering . . . . . . . . . . Output provided

Aural Modulation Peak Indicators
Peak flasher lights indicate plus and minus peaks simultaneously. Peak levels are digitally set by thumb-wheel switches, in 1% increments from 50% to 129%
- Response time . . . . . . . . . . . . 5 µsec pulse having 1 µsec rise and fall time

Modulation Calibrator
- Built-in aural modulation calibrator indicates ±100% modulation
- Accuracy . . . . . . . . . . . . . . ±2%

Audio Output
- Output level . . . . . . . . . . . . Two volt RMS minimum into 600 ohms at 100% modulation and 1 kHz. Distortion is 0.25% at 100% modulation. Residual noise at least 65 dB below two volts RMS. 75 µs de-emphasis network provided

SCA Output (Option 03)
- 39 kHz Output . . . . . . . . . One volt RMS into 600 ohms at 10% injection

AGC Meter (Option 04)
External AGC Meter mounted to the left of the Model 701 or Model 702 to indicate relative signal level when the instrument is used for off-air monitoring.

MODEL 701 SPECIFICATIONS

Off-Frequency and Over-Modulation Alarm (Option 02)
- Available as an option . . . . . . Includes circuit to actuate user-supplied aural or visual alarm
- Frequency limits . . . . . . . . ±1 kHz
- Modulation limits . . . . . . . ±100%
MODEL 701 SPECIFICATIONS (CON’T)

Aural and Visual Frequency Measurement

Digital display . . . . . . . . . . . . . . Zero to ±9.99 kHz in 10 or 1 Hz increments from assigned center frequency

Accuracy:

<table>
<thead>
<tr>
<th>Channels</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 through 13</td>
<td>±500 Hz/18 months</td>
</tr>
<tr>
<td>14 through 69</td>
<td>±500 Hz/6 months</td>
</tr>
</tbody>
</table>

Frequency standard:

Internal . . . . . . . . . . . . Uses a high-precision, oven-controlled, 5-MHz crystal oscillator. One MHz output is provided on the front panel, for calibration against WWV or a precision frequency source.

External . . . . . . . . . . . . 5 MHz input connector on rear panel

Inter-Carrier Frequency Measurement

Digital display . . . . . . . . . . . . . . Zero to ±9.99 kHz in 10 or 1 Hz increments from 4.5 MHz

Accuracy . . . . . . . . . . . . ±100 Hz/5 years

Frequency standard . . . . . . . . . . . . Same as Aural and Visual Frequency measurement

BCD Output (Option 06)

BCD equivalent of the carrier frequency error readings are brought out to the rear panel for automatic logging of the carrier frequency errors. Model 725D may be required if logging equipment used does not accept parallel BCD in TTL logic level.

Six-Digit Frequency Counter

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>10 Hz to 10 MHz</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Input sensitivity</th>
<th>200 mv to 2 V RMS</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Input impedance</th>
<th>500k ohms. Shunt by 15 pF</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Resolution</th>
<th>1 Hz</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Display accuracy</th>
<th>±1 count</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Time base aging rate</th>
<th>1 x 10^-8/day</th>
</tr>
</thead>
</table>

Physical and Environmental Specifications (Model 701 and Model 702)

<table>
<thead>
<tr>
<th>Size</th>
<th>11” w x 8” h x 15” d</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Weight</th>
<th>22 pounds (approximately)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Power</th>
<th>115/230 V, 50-400 Hz, 45 watts maximum</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Cabinet</th>
<th>Portable or rack mount (with adapter)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Operating temperature</th>
<th>0°C to 50°C</th>
</tr>
</thead>
</table>

For more information and/or a demonstration, contact the factory, address below, or your local representative.

Represented By:

TIME AND FREQUENCY TECHNOLOGY, INC.
3000 OLCOTT STREET, SANTA CLARA, CA 95051 (408) 248-6365 TWX No. 910-338-0584

Litho in U.S.A.
MODEL 701
TV FREQUENCY AND AURAL MODULATION MONITOR

UHF and VHF OFF-THE-AIR MONITORING, UP TO 18 MONTHS BETWEEN CALIBRATIONS

FEATURES

- Covers All UHF and VHF Channels
- Off-the-Air Monitoring of Visual and Aural Frequency, and Percent Aural Modulation
- 250 µV Sensitivity
- Up to 18 Months Between Calibrations (VHF)
- Digital Display of Frequency Errors
- Internal Frequency Standard Can Be Calibrated Directly Against WWVB, with Optional WWVB Receiver
- Built-In Aural Modulation Calibrator
- Digitally Settable Peak Flashers Display Plus and Minus Peaks Simultaneously
- Silicon Transistor and IC Design
- Provision for Automatic Logging
- Usable as a 6-digit Precision Frequency Counter to 10 MHz
- Portable or Rack Mount
- Optional, Super-Stable Oscillator Provides Transmitter Stability of $1 \times 10^{-9}$ per Day
- Optional Off-Frequency and Over-Modulation Alarm
- FCC Type Approved #3-187

GENERAL DESCRIPTION

The Model 701 is a state-of-the-art VHF-UHF TV Monitor designed and optimized for off-the-air monitoring of aural, visual and inter-carrier frequency and percent aural modulation. The input of the monitor consists of a channel filter and a double-balanced Schottky barrier diode mixer. As a result, intermodulation products generated in the instrument due to strong undesirable signals are several orders of magnitude lower than in an RF amplifier front end.

What's more, the Model 701 requires frequency calibration only every six months for UHF and only every 18 months for VHF. This is accomplished by the use of a precision, 5-MHz, oven-controlled crystal oscillator which synthesizes the local oscillators and which has a typical aging rate of 1 PPM/year.

Even greater stability can be provided by an accessory super stable 5-MHz crystal oscillator (Model 703) which has an aging rate of $1 \times 10^{-9}$ per day.

When the Model 701 and the Model 703 or Model 725A are used in conjunction with a VLF Comparator, the system is capable of monitoring trans-
mitters to within 1 Hz accuracy for precise frequency off-set control.

Another advantage of the Model 701 is that it has, in addition to a peak reading modulation meter, two peak flashers which measure and display plus and minus peak modulation simultaneously. Flashers are calibrated from 50% to 129%, in one percent increments, with front panel thumbwheel switches. Calibration accuracy can be checked at any time with the front panel pushbutton modulation calibrator. The aural modulation is demodulated from the inter-carrier. An "AURAL CARRIER ONLY" switch enables the user to check the inter-carrier noise due to visual modulation. The model 701 complies fully with Sections 73.693 and 73.694 of the FCC Rules and Regulations pertaining to frequency accuracy, crystal aging, frequency response, distortion, peak indication and meter ballistics.

**OPERATION**

When the incoming signal is received, the visual carrier is converted to an IF of 42.75 MHz and the aural carrier is converted to an IF of 38.25 MHz. The second mixer then converts the visual carrier to 7.25 MHz and the aural carrier to 11.75 MHz. Then, these signals are fed into two separate differential counters which digitally display the respective carrier deviations. A front panel switch allows use of one of the counters to measure inter-carrier frequency.

The frequency counters in the Model 701 can also be used as a six-digit 10-MHz general purpose frequency counter for measuring the chromatic carrier frequency and for other general applications. Conversion is made by depressing a single front panel pushbutton. Since the color subcarrier of the network programs is generated from a rubidium frequency standard, the stations receiving network originated programs can use the color subcarrier to calibrate the frequency standard in the Model 701 by using the monitor as a frequency counter.
SPECIFICATIONS

RF Input

Frequency range ................. Channels 2 through 69
Sensitivity ....................... Approx 250 μV, 60 dB automatic gain control range and
                                      40 dB fixed attenuator for monitoring at transmitter site
Image rejection ................... −60 dB
Spurious response ................ −80 dB
Local oscillator radiation ........ Conforms to FCC rules
Input impedance .................. 75 ohms
Input connector .................. BNC

Aural and Visual Frequency Measurement

Digital display .................... Zero to ±9.99 kHz in 10 or 1 Hz increments from assigned
                                      center frequency
Accuracy:
             Channels 2 through 13 ........ ±500 Hz/18 months
             Channels 14 through 69 ........ ±500 Hz/6 months
Frequency standard
             Internal ......................... Uses a high precision, oven-controlled 5 MHz crystal oscil-
                                      lator. One MHz output is provided on the front panel, for
                                      calibration against WWVB or a precision frequency source.
             External ......................... 5 MHz input connector on rear panel

Inter-Carrier Spacing Frequency Measurement

Digital display .................... Zero to ±9.99 kHz in 10 or 1 Hz increments from 4.5 MHz
Accuracy .......................... ±100 Hz/5 years
Frequency standard ............... Same as Aural and Visual Frequency measurement

Aural Modulation Meter

Modulation range .................. Meter reads full scale on 33.3 kHz deviation. Scale cali-
                                      brated to 100% at 25 kHz deviation, 133% at 33.3 kHz
c                                      deviation. Also includes dB scale (0 dB = 100%)
Frequency response ................ ±0.2 dB, 50 Hz to 15 kHz
Accuracy .......................... ±4% over entire scale for modulation frequencies between
                                      50 Hz and 15 kHz
Meter characteristics ............. True peak reading circuit scale and ballistics conform to
                                      FCC requirements
Remote metering ................... Output provided

Aural Modulation Peak Indicators

Peak flasher lights indicate plus and minus peaks simultaneously. Peak levels are digitally set by thumb-
wheel switches, in 1 percent increments from 50% to 129%.
Response time ..................... 5 μsec pulse with 1 μsec rise and fall time

Modulation Calibrator

Built-in aural modulation calibrator indicates ±100% modulation
Accuracy .......................... ±2%

Audio Output

Output level ....................... Two volt RMS minimum into 600 ohms at 100% mod-
                                      ulation and 1 kHz. Distortion is 0.25% at 100% modulation.
                                      Residual noise at least 65 dB below two volts RMS. 75 μs
c                                      de-emphasis network provided

SCA Output

39 KHz output ..................... One volt RMS into 600 ohms at 10% injection;
### SPECIFICATIONS (cont.)

#### Off-Frequency and Over-Modulation Alarm
- Available as an option
- Frequency limits: ±1 kHz
- Modulation limits: ±100%

#### Six-Digit Frequency Counter
- Frequency range: 10 Hz to 10 MHz
- Input sensitivity: 200 mv to 2 V RMS
- Input impedance: 500 k ohms. Shunt by 15 pF
- Resolution: 1 Hz
- Display accuracy: ±1 count
- Time base aging rate: $1 \times 10^{-8}$/day

#### Physical and Environmental Specifications
- Size: 11” w x 8” h x 15” d
- Weight: 22 pounds (approx)
- Power: 115/230 V, 50-400 Hz, 45 watts max.
- Cabinet: Portable or rack mount (with adapter)
- Operating temperature: 0° C to 50° C

### ACCESSORY EQUIPMENT

- Model 703 super stable time base, 5.6” w x 8” h x 15” d. Mounts next to Model 701.
- Model 704 Remote Meter and Flasher Panel, 19” w x 5-1/4” h x 3” d. Duplicates the Modulation Meter and Peak Modulation Flashers of the Model 701. FCC type approved.
- Model 725 Automatic Logging Adapter and Digital Clock, Analog Voltage Outputs of Visual and Intercarrier Frequency Errors, 5.6” w x 8” h x 15” d. Mounts next to Model 701.
- Model 725A Combination of Model 703 and Model 725, 5.6” w x 8” h x 15” d. Mounts next to Model 701.

For more information and/or a demonstration, contact the factory at the address below, or your local representative.

Represented By

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**TIME AND FREQUENCY TECHNOLOGY, INC.**
**2950 SCOTT BLVD. – SANTA CLARA, CA. 95050 – (408) 246-6365**

Litho in USA
FEATURES
- No Overshoot Linear Phase Filtering
- Broadband Demodulation, 500 kHz to 4 MHz
- Digital Peak Indicators
- Built-in Voltmeter
- Carrier-Level Measurement Metering
- Wide Frequency Response, 20 Hz to 25 kHz
- Self-Calibrating
- Wide Range of Plug-In Options Including:
  - Carrier Power Level Alarm;
  - Absence of Modulation Alarm;
  - 10 kHz Whistle Filter;
  - 35 kHz Low-pass Filter (sub-audio telemetry)
- Remote Meter & Peak Flasher Panel Available

GENERAL DESCRIPTION
The TFT Model 753 AM Modulation Monitor is a precision instrument which permits extremely accurate Proof-of-Performance measurements and transmission monitoring. The accuracy is better than 1.0%. The Model 753 is also fully adaptable to Automatic Transmission Systems (ATS).

RF PRESELECTOR EXPANSION
Although the basic 753 is designed for direct transmitter connection, you can use it off-air by adding the 755A Tunable Preselector Module. In addition to offering off-air monitoring, the frequency-synthesized digital tuning 755A Preselector allows you to easily compare the modulation performance of competitive stations. The only requirement for this off-air operation is an antenna, no external RF amplifiers are needed.

The Preselector permits tuning in 1.0 kHz increments with a 4-digit front panel thumbwheel switch.

For the highest accuracy when performing Proof-of-Performance measurements, TFT recommends that only the basic baseband unit be used at the transmitter site. This minimizes the off-air noise pick-up through the Preselector.

NO OVERSLEW PERFORMANCE
The Model 753 is designed with linear phase filters to eliminate transient filter overshoot which results from the heavy amplitude clipping of today's audio processing devices. Because of this exclusive design, overshoot problems caused by fast rise and fall time modulation are eliminated. The oscilloscope photo demonstrates the demodulated waveform of a square wave modulated RF carrier (top trace); note the complete absence of overshoot. Even in off-air use, overshoot is nearly non-existent due to a proprietary IF filter design (patent pending) in the Preselector. In the presence of clipped audio signals, the 753 provides sharp selectivity as well as negligible overshoot (less than 3.0% with a 25 µsec rise and fall time).

BROADBAND DEMODULATION
The Model 753 operates on any RF frequency between 500 kHz and 4 MHz with a 1 to 10 volt input while meeting all specifications. Operation to as low as 250 kHz is possible with very little degradation. With a simple change to the input transformer, the 753 can operate as high as 200 MHz. This factory modification is available on request at the time of ordering.

(continued—over)
DIGITAL PEAK INDICATORS

The Model 753 contains three peak flashers which provide quick visual monitoring. These indicators "catch" modulation transients which would normally not register on the Modulation Meter. The -100% and +125% indicators are factory set at the modulation extremes specified by the FCC. The third indicator is digitally programmable to eliminate the ambiguities of potentiometer-type controls. To measure actual peak modulation, this indicator can be set for positive or negative peaks from 1 to 150% in 1.0% increments. Both the peak flashers and the modulation meter are self-calibrating to maintain their accuracy over a ±40% carrier level change.

![Digitally-settable Peak Flasher and Carrier Level Metering](image)

CARRIER LEVEL MEASUREMENTS

When connected to the transmitter, the 753 will directly measure changes in carrier power and carrier shift when modulation is applied. These measurements are read on the carrier level meter.

WIDE AUDIO RESPONSE

The Audio Response of the 753 is virtually flat from 20 Hz to 25 kHz (with a 3 dB roll-off at 80 kHz). The Total Harmonic Distortion (THD) is less than 0.15% at 99% modulation.

INTERNAL SELF-CALIBRATION

The 753 also contains a built-in AM Calibrator which provides both the -100% and +125% peak modulation reference levels. The signal used for the calibration is a true amplitude modulated RF carrier generated internally by digital circuitry. The AM calibrator provides a thorough check-out of the 753's performance from input to output.

BUILT-IN VOLTmeter

The 753 includes a built-in 50 dB attenuator calibrated in 10 dB steps for making Proof-of-Performance measurements. From the front panel, frequency response measurements as well as residual hum and noise (to -70 dB) can be made.

![Top: Demodulated audio output. Bottom: 1 kHz square wave modulated RF carrier at 1 MHz applied to the input. Note the complete absence of overshoot under both operating conditions.](image)

PLUG-IN OPTIONS

A wide range of field-installable options increases the versatility of the 753. Included in these are: Carrier Power Level Alarm; Absence-of-Modulation Alarm; 10 kHz Whistle Filter; and a 35 Hz Low Pass Filter for sub-audio telemetry. All of these options are on plug-in circuit boards and can be added at any time to the 753.

ACCESSORY EQUIPMENT

In addition to the plug-in options, the 753 can also be ordered with an the Model 704E Remote Meter and Peak Flasher Panel which duplicates the 753's meter and peak flashers. This accessory panel includes 50 feet of cable. Additionally, the rear panel external meter output can be modified to provide an opposite modulation polarity signal to drive the 704E Remote Panel. This modification offers the convenience of having two meters to display positive and negative modulation simultaneously.
AM Modulation Monitor

MODEL 753 BLOCK DIAGRAM

SPECIFICATIONS

RF INPUT

Frequency Range ............... 500 kHz to 4 MHz
Level Range ............... 10 V to 10 V RMS
Impedance, nominal .......... 50 ohms
*Higher frequency ranges available on request.

MODULATION METER

Meter Range ............... 0 to 133%, switchable "+" or "-
Attenuator Range ............... 0 to -50 dB in 10 dB steps
Accuracy (at 100% mod., 400Hz) ............... ± 2.0%

Frequency Response ............... 50 Hz to 10 kHz, ± 2.0%
30 Hz to 25 kHz, ± 5.0%

PEAK MODULATION INDICATORS

-100% Indicator ............... Internally set to flash when modulation exceeds -99%
+125% Indicator ............... Internally set to flash when modulation exceeds +125%
Accuracy (both indicators) ............... ± 1.0% at 400 Hz
Frequency Response (both indicators) ............... ± 5.0%, 20 Hz to 25 kHz

(Specifications continued—over)
03-10 kHz Whistle Filter Switchable; 10 kHz 
Rejection = >40 dB
04-Telemetry Low Pass Filter 
(35 Hz) 0 dBm for 5.0% modulation, 20 Hz to 30 Hz
05-Absence of Modulation 
Alarm Open collector output for sinking 
30 V, 50 mA load. When modulation 
drops below 10%, output goes low 
after an internally adjusted time of 
approximately 2 to 30 seconds

PHYSICAL

Size & Weight 19" W X 5 1/4" H X 14" D; 14 lbs net
Power 115/230 VAC, 50—400Hz, 30 watts maximum
Operating Temperature 0°C to 50°C

MODEL 755A PRESELECTOR

Frequency Range 500 kHz to 1.99 MHz in 1.0 kHz 
increments
RF Sensitivity 100 µV for 35 dB, 10 mV for 50 dB 
S/N, Ref. to 100%
Input Impedance 50 ohms nominal
Bandwidth (Wideband 
Standard) ± 10 kHz, 10 dB ± 20 kHz, 3.0 dB 
± 30 kHz, 40 dB
Transient Response <3.0% overshoot for 25 µsec rise 
and fall times on RF envelope
Bandwidth (narrow band, optional 
selectable by front panel 
switch) ± 5 kHz, 10 dB 
± 10 kHz, 3.0 dB 
± 20 kHz, 40 dB
Transient Response 3.0% overshoot for 50µsec rise 
and fall times on RF envelope
Image Rejection >60 dB
AGC Range 100 µV to 32 mv
Output 450 kHz, 10 V RMS into 50 ohms

POWER (independent of 
Model 753) 115/230 VAC, 50-400 Hz, 15 watts maximum
Operating Temperature 0°C to 50°C
## PRICE SCHEDULE
### BROADCAST MONITORING EQUIPMENT

<table>
<thead>
<tr>
<th>TV PRODUCTS</th>
<th>October 1, 1979</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL 701</strong></td>
<td><strong>TV FREQUENCY &amp; AURAL MODULATION</strong></td>
</tr>
<tr>
<td></td>
<td>MONITOR, Rack Mount</td>
</tr>
<tr>
<td></td>
<td>Specify Channel &amp; Offset</td>
</tr>
<tr>
<td>Option 02</td>
<td>Alarm (frequency and modulation)</td>
</tr>
<tr>
<td>Option 03</td>
<td>SCA Output</td>
</tr>
<tr>
<td>Option 04</td>
<td>AGC Meter (visual/aural carrier level)</td>
</tr>
<tr>
<td>*Option 06</td>
<td>Automatic Logging Output (BCD)</td>
</tr>
<tr>
<td>*Option 07</td>
<td>CCIR Format</td>
</tr>
<tr>
<td>Option 08</td>
<td>Spare Parts Kit</td>
</tr>
<tr>
<td><strong>MODEL 702</strong></td>
<td><strong>TV AURAL MODULATION MONITOR,</strong> Rack Mount</td>
</tr>
<tr>
<td></td>
<td>Specify Channel &amp; Offset</td>
</tr>
<tr>
<td>Option 02</td>
<td>Alarm (modulation only)</td>
</tr>
<tr>
<td>Option 03</td>
<td>SCA Output</td>
</tr>
<tr>
<td>Option 04</td>
<td>AGC Meter (visual/aural carrier level)</td>
</tr>
<tr>
<td>Option 05</td>
<td>Spare Parts Kit</td>
</tr>
<tr>
<td><strong>MODEL 704</strong></td>
<td><strong>Remote Meter and Peak Flasher Panel</strong></td>
</tr>
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<table>
<thead>
<tr>
<th>FM PRODUCTS</th>
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</thead>
<tbody>
<tr>
<td><strong>MODEL 763</strong></td>
<td><strong>FM Modulation Monitor (Specify Frequency)</strong></td>
</tr>
<tr>
<td></td>
<td>Balanced Audio Output (Standard)</td>
</tr>
<tr>
<td>Option 01</td>
<td>Carrier Power Alarm, +5% - 10% (does not work with preselector)</td>
</tr>
<tr>
<td>Option 02</td>
<td>Absence-of-Modulation Alarm</td>
</tr>
<tr>
<td>Option 04</td>
<td>230 VAC</td>
</tr>
<tr>
<td>Option 06</td>
<td>Spare Parts Kit</td>
</tr>
<tr>
<td><strong>MODEL 764A</strong></td>
<td><strong>FM Preselector with Frequency Readout, Tunable</strong></td>
</tr>
<tr>
<td></td>
<td>BCD Output</td>
</tr>
<tr>
<td>*Option 01</td>
<td>Frequency Alarm (± 2kHz)</td>
</tr>
<tr>
<td>*Option 02</td>
<td>Spare Parts Kit</td>
</tr>
<tr>
<td><strong>MODEL 765A</strong></td>
<td><strong>FM Preselector (Modulation Only), Tunable</strong></td>
</tr>
<tr>
<td></td>
<td>TCXO Time Base</td>
</tr>
<tr>
<td>Option 01</td>
<td>Spare Parts Kit</td>
</tr>
<tr>
<td><strong>MODEL 785</strong></td>
<td><strong>Single Channel FM Preselector</strong></td>
</tr>
<tr>
<td><strong>MODEL 704F</strong></td>
<td><strong>Remote Meter and Peak Flasher Panel</strong></td>
</tr>
<tr>
<td><strong>MODEL 724 A</strong></td>
<td><strong>STEREO MONITOR</strong></td>
</tr>
<tr>
<td></td>
<td>Spare Parts Kit</td>
</tr>
<tr>
<td><strong>MODEL 704C</strong></td>
<td><strong>Remote Meter Panel</strong></td>
</tr>
<tr>
<td><strong>MODEL 730A</strong></td>
<td><strong>SCA MONITOR, 67 kHz</strong></td>
</tr>
<tr>
<td>Option 01</td>
<td>SCA Channel (41 kHz)</td>
</tr>
<tr>
<td>Option 02</td>
<td>Spare Parts Kit</td>
</tr>
<tr>
<td><strong>MODEL 704B</strong></td>
<td><strong>Remote Meter Panel</strong></td>
</tr>
</tbody>
</table>
| *Not Field Installable

- N/C: Not Available
- BCD: Binary-Coded Decimal
- CCIR: Comité Consultatif International des Radiocommunications
- TCXO: Temperature Compensated Crystal Oscillator
# Broadcast Monitoring Equipment

## AM Products

<table>
<thead>
<tr>
<th>Model 753</th>
<th>AM Modulation Monitor</th>
<th>$1,145.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 01</td>
<td>Balanced Audio Output (Standard)</td>
<td>N/C</td>
</tr>
<tr>
<td>Option 02</td>
<td>Carrier Power Alarm (does not work with preselector)</td>
<td>$145.00</td>
</tr>
<tr>
<td>Option 03</td>
<td>10 kHz Whistle Filter</td>
<td>$145.00</td>
</tr>
<tr>
<td>Option 04</td>
<td>30 Hz Telemetry Lowpass</td>
<td>$95.00</td>
</tr>
<tr>
<td>Option 05</td>
<td>Absence-of-Modulation Alarm</td>
<td>$175.00</td>
</tr>
<tr>
<td>Option 06</td>
<td>230 VAC</td>
<td>N/C</td>
</tr>
<tr>
<td>Option 07</td>
<td>Spare Parts Kit</td>
<td>$140.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>*Model 754</th>
<th>AM RF Preselector with Frequency Readout</th>
<th>$1,570.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 01</td>
<td>Narrow Band Filter</td>
<td>$275.00</td>
</tr>
<tr>
<td>*Option 02</td>
<td>BCD Output</td>
<td>$200.00</td>
</tr>
<tr>
<td>*Option 03</td>
<td>Frequency Alarm ($\pm$ 20 Hz)</td>
<td>$155.00</td>
</tr>
<tr>
<td>Option 04</td>
<td>Spare Parts Kit</td>
<td>$180.00</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>*Model 755</th>
<th>AM RF Preselector (Modulation Only)</th>
<th>$850.00</th>
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<tbody>
<tr>
<td>Option 01</td>
<td>Narrow Band Filter</td>
<td>$275.00</td>
</tr>
<tr>
<td>Option 02</td>
<td>TCXO Time Base</td>
<td>$250.00</td>
</tr>
<tr>
<td>Option 03</td>
<td>Spare Parts Kit</td>
<td>$95.00</td>
</tr>
</tbody>
</table>

| Model 704E | Remote Meter and Peak Flashers | $295.00 |

## EBS Products

| Model 760-1A | AM Receiver/Encoder/Decoder | $760.00 |
| Model 760-1B | Single Channel FM Receiver/Encoder/Decoder | $760.00 |
| Model 760-1C | Dual Channel FM Receiver/Encoder/Decoder | $795.00 |
| Model 760-3  | Encoder/Decoder | $575.00 |
| Model 760-2A | AM Receiver/Decoder | $525.00 |
| Model 760-5A | Single Channel FM Receiver/Decoder | $525.00 |
| Model 760-5B | Dual Channel FM Receiver/Decoder | $580.00 |
| Model 761-1A | AM Receiver/Decoder (Desk Top) | $550.00 |
| Model 761-1B | Single Channel FM Receiver/Decoder | $550.00 |
| Model 761-5B | Dual Channel FM Receiver/Decoder (Desk Top) | $555.00 |
|             | AM Receiver Module, Frequency Synthesized | $230.00 |
|             | FM Receiver Module, Single Channel, Crystal Controlled | $230.00 |
|             | FM Receiver Module, Dual Channel, Crystal Controlled | $290.00 |
|             | Two-Tone Generator Module | $280.00 |
|             | Two-Tone Decoder Module | $190.00 |

## Terms of Sale

All shipments are made F.O.B. Santa Clara, California. Terms are net 30 days to customers who have a satisfactory established line of credit with us. Others should arrange with the factory for payment at the time of shipment.

### Warranty

Time and Frequency Technology, Inc. warrants each of the instruments of its manufacture to be produced to meet the specifications delivered to the BUYER, and to be free from defects in material and workmanship; and will repair or replace at its expense, for a period of one year from the date of delivery of equipment, any parts which are defective from faulty material or workmanship. Equipment, accessories, tubes and batteries not manufactured by TFF are subject only to such warranties as those listed by the manufacturer.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charge prepaid by BUYER. It is expressly agreed that replacement and/or repair shall be the sole remedy of BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER, prior to such returns. Upon examination by the factory, if the instrument is found to be defective, the unit will be repaired and returned to the BUYER, with transportation charge paid by SELLER.

Transportation charges for instruments found to be defective within the first thirty (30) days of the warranty period will be paid both ways by the SELLER. Transportation charges for warranty returns and repair costs, wherein failure is found not to be the fault of the SELLER, shall be paid both ways by the BUYER.

This warranty does not apply to instruments which, in the opinion of the SELLER, have been altered or misused. No other warranty is expressed or implied. We are not liable for consequential damages. Price subject to change without notice.

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*TFT* 3090 OAKMEAD VILLAGE DR., SANTA CLARA, CA. 95051 (408)246-6365 TWX 910-338-0584

*Not Field Installable*
TWO TONE GENERATOR
EMERGENCY BROADCAST SYSTEM

READY WHEN IT COUNTS
The Model 760 EBS System is designed for broadcasters to meet Parts 73.940, 73.941 and 73.942 of the FCC Rules and Regulations for decoding and encoding the two-tone EBS alert signal. The modular construction of the system provides for maximum versatility and consists of a cabinet assembly, AM or FM receiver, two-tone decoder and a two-tone generator. Two or three of these modules can be combined into a cost-effective operational EBS System.

**Model 760-00 Cabinet Assembly**

The Model 760-00 Cabinet Assembly is designed to accept up to three of the EBS modules described below. Stand alone units may be constructed by ordering the Model 760-00 cabinet and any particular module. A fully loaded cabinet would consist of the Two-Tone Generator on the left, either AM or FM Receiver in the center, and the Two-Tone Decoder on the right. Blank panels are used as fillers where modules are not installed.

**Tunable, Frequency Synthesized AM Receiver**

The AM receiver, Model 760-01, is a continuously tunable AM broadcast receiver using a frequency synthesized local oscillator which is phase locked to a 5 MHz crystal oscillator. The local oscillator is tuned by means of a 3 digit front panel thumbwheel switch in 10 kHz steps. The stability of the receiver is that of the crystal oscillator regardless of which AM channel is being received. Positive tuning to any desired station is accomplished by dialing the frequency of the selected station and peaking the RF amplifier tuning. The CARRIER light will come on only when the desired station is received. A rear panel terminal is provided for activating external carrier-off alarm circuitry.

In addition to broadcast station use, the AM Receiver provides a low cost monitor for all emergency service agencies, such as police, fire, Civil Defense, hospitals, etc. These services can listen to key EBS participating stations in the local area during any emergency.

**Crystal Controlled, Dual Channel FM Receiver**

The FM Receiver, Model 760-02, is a high performance dual channel, fixed frequency FM broadcast receiver. Channel selection is accomplished by a push-button switch. Both channels are fixed tuned and the crystals are factory installed. A one channel version is also available. The CARRIER light will come on only when the desired station is received. A rear panel terminal is provided for activating external carrier-off alarm circuitry. Specify number of channels and frequency with order.

The latest MOS FET and LSI integrated circuits are used to achieve simplicity in circuit design and reliability. The 10.7 MHz IF consists of two ceramic filters for excellent selectivity.

The FM Receiver is ideally suited for FM intercity relay networks. These networks are a key link in the EBS alerting procedure. The quality built into the FM Receiver modules makes it possible to pick-up and re-broadcast emergency programming without degradation of signal quality.

**Two-Tone EBS Decoder**

The TFT Two-Tone Decoder, Model 760-03, decodes the 853 Hz and 960 Hz EBS signaling tones from the demodulated output of a receiver. It may be used in conjunction with TFT's Model 760-01 AM Receiver, Model 760-02 FM Receiver, or any audio source which has the EBS Two-Tone signal at 100 mV rms or greater. Stable piezoelectric tuning fork filters are used to achieve ±5 Hz bandwidth from the center frequency of each tone. The timing circuit for the 10 second delay is a signal averaging integrator which eliminates false turn-on by noise. An amplifier and loudspeaker are built-in for audio monitoring. Volume control is internally preset.

**Two-Tone EBS Generator**

The Two-Tone EBS Generator, Model 760-04, generates the 853 Hz and 960 Hz tones simultaneously with an accuracy of ±0.25 Hz. The frequency and stability of the tones are accomplished by synthesizing the tones from a single crystal oscillator.

Model 760-04 should be installed in the program audio line before the audio limiter. A single channel of audio can be routed through the Generator. (For multichannel routing, see the application note below right.) When the generator is activated, program audio is automatically interrupted, the EBS tones inserted, and The Emergency Program Audio is connected to the output. Program audio is restored by the RESET switch.
The generator is activated by two front panel COMMAND switches which need to be simultaneously operated to prevent accidental activation. COMMAND and RESET functions can be remotely controlled through rear panel wiring. The amplitude of each tone can be checked and adjusted individually.

Order Information

MODEL 760-1A, AM Receiver/Encoder/Decoder
MODEL 760-1B, Single Channel FM Receiver/Encoder/Decoder
MODEL 760-1C, Dual Channel FM Receiver/Encoder/Decoder
MODEL 760-3, Encoder/Decoder
MODEL 760-00, Chassis Assembly
MODEL 760-01, EBS AM Receiver
MODEL 760-02, EBS Single Channel FM Receiver
MODEL 760-03, EBS Tone Decoder
MODEL 760-04, EBS Two Tone Generator (available with or without power supply)
MODEL 760-06, EBS Dual Channel FM Receiver

MODEL 760 EBS SYSTEM
TYPICAL COMBINED AM-FM-TV APPLICATION

TOTAL RELAY CURRENT NOT TO EXCEED 250 mA

K1, K3: POTTER & BRUMFIELD R10-E1-Y2-V185
K2: POTTER & BRUMFIELD R10-E1-Y4-V185
CR1, CR2, CR3: HPA 5082-4487
**SPECIFICATIONS**

**Model 760-00, EBS Cabinet Assembly**

- **Model Capacity**
  - Will accept up to three EBS modules (01, 02, 03, 04)
  - Blank panels provided for less than three models.

- **Input Power**
  - 115 ±15% VAC, 50/60 Hz, 20 watts maximum

- **Operating Temperature**
  - 0° to 50°C
  - 3.5” high x 19” wide x 12” deep

- **Size**
  - Approx. 10 pounds (4.5 kg)

**Model 760-01, Frequency-Synthesized AM Receiver**

- **Frequency Range**
  - 540 – 1620 kHz

- **Local Oscillator**
  - ±500 Hz per year

- **Stability**
  - Channel frequency digitally set

- **Tuning Method**
  - 10 kHz steps by thumbwheel switches.

- **Antenna Input**
  - 75 ohms nominal, unbalanced

- **Sensitivity**
  - 30 µV for 20 dB S/N at 30% modulation.

- **Image Rejection**
  - 50 dB

- **AGC**
  - 70 dB

- **IF Bandwidth, 6dB**
  - ±5 kHz

- **Harmonic Distortion**
  - Less than 3% at 90% modulation.

- **Noise**
  - 45 dB or greater below 100% modulation with 10 MV RF modulation.

- **Audio Outputs**
  - Balanced: ±8 dBm
  - Unbalanced: 1 V rms

- **Carrier-Off Output**
  - Active pullup to 10 V, 10 ma

**Model 760-02, Crystal Controlled FM Receiver**

- **Frequency Range**
  - 88 – 108 MHz

- **Channel Frequency**
  - Specify frequency, either one or two channel versions available.

- **Antenna Input**
  - 75 ohms nominal, unbalanced

- **Sensitivity**
  - 2 µV for 30 dB of quieting.

- **IF Bandwidth, 6dB**
  - ±150 kHz

- **Image Rejection**
  - 40 db

- **AGC**
  - 80 db

- **Audio Frequency Response**
  - ±1 dB, 50 Hz – 15 kHz

- **Harmonic Distortion**
  - 1%

- **S/N Ratio**
  - 60 dB or greater below 100% modulation at 50 µV RF input

- **De-emphasis**
  - 75 µ sec

- **Audio Outputs**
  - 600 ohms
    - Balanced: ±8 dBm
    - Unbalanced: 1 V rms

- **Carrier-Off Output**
  - Active pullup to 10V, 10 ma

**Model 760-03, Two-Tone Decoder**

- **Input Level Required**
  - 100 mV into 600 ohms

- **Tone Frequencies**
  - 853 Hz and 960 Hz

- **Bandwidth**
  - ±5 Hz

- **Listen Operate Switch**
  - In Operate mode the loudspeaker is muted until an EBS alert is decoded.
  - In Listen mode, the loudspeaker is demuted.

- **Audio Output**
  - 1 Watt, internal loudspeaker

- **Reset Switch**
  - Resets decoder and mutes loudspeaker

Remote Operation

- The RESET switch wiring is brought out to the rear panel

Time Delay

- 12 seconds ±4 seconds

External Alarm

- SPDT relay contacts brought out to rear panel

**Model 760-04, Two-Tone Generator**

- **Output Frequencies**
  - 853 Hz and 960 Hz

- **Frequency Accuracy**
  - ±0.25 Hz, crystal controlled

- **Output Level**
  - +8 dBm nominal (per tone)

- **Output Impedance**
  - 600 ohms, balanced

- **Harmonic Distortion**
  - Less than 2%

- **Tone Duration**
  - 23.4 seconds, ±0.15 seconds

- **Tone Level Adjust**
  - Front panel pot, –2 dBm to +8 dBm

- **Program Audio Routing**
  - Rear panel DPDT relay contacts. Balanced input and output. Switch-over and latch to EBS programming is automatic.

- **Emergency Program Audio Input**
  - Unbalanced input. Internally inserted into program line.

- **Test Switch**
  - Connects Generator to Decoder for testing without interrupting program audio.

- **Tone Switch**
  - Enables one tone at a time for setting level and checking distortion.

- **Command Switches**
  - 2 toggle switches. Must be activated in opposite directions to turn on Generator.

- **Reset Switch**
  - Releases latch to restore normal program audio.

Remote Operation

- The COMMAND and RESET switch wiring is brought to the rear panel.

**SPECIFICATIONS ARE TYPICAL AND SUBJECT TO CHANGE WITHOUT NOTICE.**

**SPECIFICATION APPLIES TO ALL MODULES.**

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*For multichannel audio switching, see diagram on page 3.*
8300 Series

WIDEBAND-COMPOSITE BROADCAST QUALITY AURAL STUDIO-TRANSMITTER LINK AND INTER-CITY RELAY SYSTEM

110 MHz - 250 MHz
400 MHz - 500 MHz
300 MHz - 375 MHz
800 MHz - 960 MHz
The Leading Edge of STL Technology

TFT 8300 broadcast quality aural Studio Transmitter Link and inter-city relays open a new generation of superior STL technology keyed to the increasing demand for system performance and versatility. They are the result of years of experience in STL and FM transmitter monitoring technology. To meet today's demands for improved signal-to-noise ratio, better stereo separation, reliable operation in dense RF signal environments, AM stereo applications and automatic "hot-standby" switch over, such state-of-the-art features are all incorporated into the revolutionary design of the new TFT 8300 Series.

System Features

- Superior System Performance — better than 75 dB signal-to-noise ratio, 50 dB stereo separation, three-to-one protection against adjacent channels.
- Full Front Panel Metering — Diagnostic metering capabilities facilitate key system performance checks and monitoring.
- Bargraph Display of Modulation — A bargraph display is used in both transmitter and receiver for displaying percentage of modulation.
- Hot Standby — Fully automatic switch-over to hot standby receiver or transmitter.
- Modular Construction — For low maintenance cost and ease of field servicing.
- IF Repeater — For difficult path problems.

For Major Market's RF Signal Environment

The 8300 is specifically designed for the major market's RF signal environment where it becomes increasingly difficult to operate composite STLs with the large number of signals present in the 940-960 MHz band. By using the latest technology and components, such as S.A.W. filters, selectable RF front end gain, variable bandwidth IF amplifiers and cast aluminum RF shielded housings for critical circuits; TFT engineers were able to design one of the best STL systems available to the broadcast industry for aural program transmission.

The Transmitter

The RF carrier is generated by a UHF VCO which is phase locked to another VCO operating at an intermediate frequency (IF) of 60 to 80 MHz. Composite modulation is taking place at the IF VCO which is also frequency synthesized to a stable crystal source. Since no multiplier is used in the entire transmitter, the RF carrier is therefore the exact reproduction of the IF VCO.

Features

- Direct Locked RF Carrier — RF carrier is directly generated, without multiplication, by a UHF VCO which is phase locked to an IF VCO.
- IF Modulation — The carrier modulation is applied to an IF frequency between 60 and 80 MHz to achieve excellent signal-to-noise ratio and stereo performance.
- Fully Protected — The output is fully protected against short and open circuits as well as high VSWR.
- Wide Baseband Bandwidth — Two additional FM subcarriers may be inserted into the baseband in addition to the main and stereo channels.

TRANSMITTER BLOCK DIAGRAM

ANTENNA INPUT

COAXIAL FILTER

RF AMP

14 WATTS

PROGRAM INPUTS

VCO 940-960 MHz

MIXER

SAMPLING PHASE-LOCKED OSC.

REFERENCE XTAL OSC.

PHASE DETECTOR

LOW PASS FILTER

PHASE LOCK LOOP CORRECTION

N

IF VCO 60 MHz-80 MHz

PHASE DETECTOR

PHASE LOCK LOOP CORRECTION

REFERENCE XTAL OSC.
The Receiver
The design of the 8300 receiver incorporates several unique features that provide low noise, high gain and great versatility. All receivers allow for automatic change-over to "Hot Standby" in the event of a detected malfunction.

Features
- S.A.W. Filter—Surface Acoustic Wave (S.A.W.) filter is used at the first IF amplifier to provide superior selectivity and, at the same time, to eliminate phase distortion for excellent stereo performance and frequency response.
- Pulse-Counting Discriminator—A unique pulse-counting discriminator circuit provides ultra-linear FM demodulation to achieve low harmonic and inter-modulation distortion.
- Selectable IF Bandwidth—Two IF bandwidths are available, depending on signal conditions. The wide band is used in normal environment operation and the narrow band is used where adjacent channel interference is high.
- Hi-Low Gain RF Amplifier—A selectable HI or LOW gain RF amplifier protects the amplifier from being overdriven by strong input signals.

Applications
- Dense RF Environment—Designed to meet the stringent requirements of top-market stations which are located in congested RF environments.
- Inter-City Relay Systems—By interconnecting a number of STL systems in series, broadcast quality audio links between cities may be achieved, providing high quality stereo or multi-channel audio service to each city.
- Multiple Program Channels—Superior T.F.T 8300 performance allows the use of FM subcarriers or FDM in addition to the composite stereo signal. (Subchannel audio can respond to 15 kHz).
- AM Stereo—With a T.F.T designed stereo optional decoder, the 8300 provides L and R channel outputs when the STL transmitter is used in conjunction with a standard FM stereo generator.
- Multihops—To overcome long path lengths and to circumvent physical obstructions.

Accessories and Options

92 kHz SCA Capability (option 16): Allows the 8300 System to transmit a 92 kHz SCA channel through the entire STL System (SCA generator located at studio). Consult factory for full details and specifications.

Stereo Decoder (option 15): Built-in stereo board for decoding left and right channels. (For AM stereo applications).

IF Repeater (option 22): Additional relay receiver circuitry to retransmit the program material without disturbing the audio baseband on multi-hop STL systems.

Model 7770 Transmitter Automatic Changeover: This is a 1 3/4" rack mount unit which monitors critical parameters in the transmitters. If a fault is detected, it automatically switches to the hot standby transmitter. Change-over can also be accomplished by a front panel switch or relay contact closure in the remote control equipment. The unit is self-powered and switches RF output to the antenna.

Model 7773 Receiver Automatic Change-over: Similar to the Model 7770. Model 7773 monitors the parameters in the receivers. The unit switches the program channel output as well as both subcarrier outputs.

Frequency Division Multiplex (FDM) Baseband Encoder and Decoder: Multiple broadcast programs can be transmitted with full audio bandwidth by using the FDM encoder and decoder.

Other Accessories: TFT carries a full line of accessories such as coaxial cable, type N connectors and antennas to meet STL system installation requirements. Please refer to STL Price List for detailed information.
## Specifications

### System

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Frequency Ranges</td>
<td>110 - 250 MHz, 300 - 375 MHz</td>
</tr>
<tr>
<td>Frequency Ranges</td>
<td>400 - 500 MHz, 800 - 960 MHz</td>
</tr>
<tr>
<td>Frequency Response</td>
<td>± 0.1 dB or better 30 Hz to 53 kHz</td>
</tr>
<tr>
<td>Frequency Response</td>
<td>± 0.3 dB or better 53 to 75 kHz</td>
</tr>
<tr>
<td>Distortion (THD &amp; IMD)</td>
<td>0.2% or less 30 Hz to 75 kHz</td>
</tr>
<tr>
<td>Distortion (THD &amp; IMD)</td>
<td>(Typically less than 0.1% at 1 kHz)</td>
</tr>
<tr>
<td>Stereo Separation</td>
<td>50 dB or better, 400 Hz to 10 kHz; 45 dB or better, 50 Hz to 10 kHz and 1 kHz to 15 kHz; (Minimum 45 dB Narrow Selectivity)</td>
</tr>
<tr>
<td>Stereo Separation</td>
<td>50 dB or better</td>
</tr>
<tr>
<td>Stereophonic Subchannel to Main Channel Crosstalk</td>
<td>50 dB or better</td>
</tr>
<tr>
<td>Main Channel to Stereophonic Subchannel Crosstalk</td>
<td>50 dB or better</td>
</tr>
<tr>
<td>Signal-to-Noise Ratio</td>
<td>75 dB or better below 100% modulation de-emphasized left or right</td>
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### Transmitter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF Power Output</td>
<td>.4 Watts minimum</td>
</tr>
<tr>
<td>RF Output Connector</td>
<td>14 Watts maximum</td>
</tr>
<tr>
<td>Deviation for 100% Modulation</td>
<td>± 50 kHz</td>
</tr>
<tr>
<td>Deviation for 100% Modulation</td>
<td>Better than .0001%, 0°C to 50°C</td>
</tr>
<tr>
<td>Frequency Stability</td>
<td>.60 dB or more below carrier level</td>
</tr>
<tr>
<td>Modulation Capability</td>
<td>One Stereo Composite Program and Two Subcarrier Channels</td>
</tr>
<tr>
<td>Modulation Inputs</td>
<td>Composite: 3.5V peak to peak.</td>
</tr>
<tr>
<td>Modulation Inputs</td>
<td>10K ohms balanced and unbalanced, BNC and terminal strip.</td>
</tr>
<tr>
<td>Modulation Inputs</td>
<td>Multiplex: 1.5V peak-to-peak, 10K ohms BNC, (2 each), frequency range 130 to 300 kHz</td>
</tr>
<tr>
<td>Power Source</td>
<td>115/230 VAC ± 10%, 50/60 Hz, 80 Watts</td>
</tr>
<tr>
<td>Power Source</td>
<td>24 VDC optional</td>
</tr>
<tr>
<td>Monitoring Capability</td>
<td>One 2&quot; analog meter for monitoring power output, power supply, bias voltages, multiplex and program modulation. LED bargraph for monitoring 70 to 120% program channel modulation.</td>
</tr>
</tbody>
</table>

### Receiver

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>RF Input Connector</td>
<td>Type N Female, 50 ohm</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>.40uV or less required for 60 dB SNR broadband, de-emphasized. 100uV or less required for 60 dB SNR left or right channel demodulated.</td>
</tr>
<tr>
<td>Selectivity (wide)</td>
<td>3 dB IF bandwidth ± 200 kHz</td>
</tr>
<tr>
<td>Selectivity (wide)</td>
<td>60 dB IF bandwidth ± 700 kHz</td>
</tr>
<tr>
<td>Selectivity (wide)</td>
<td>80 dB IF bandwidth ± 1.2 MHz</td>
</tr>
<tr>
<td>Selectivity (narrow)</td>
<td>3 dB IF bandwidth ± 150 Khz</td>
</tr>
<tr>
<td>Selectivity (narrow)</td>
<td>60 dB IF bandwidth ± 500 kHz</td>
</tr>
<tr>
<td>Selectivity (narrow)</td>
<td>80 dB IF bandwidth ± 1.2 MHz</td>
</tr>
<tr>
<td>Modulation Outputs</td>
<td>Composite: 3.5V peak-to-peak, 75 ohm balanced and unbalanced, BNC and clip lead. Multiplex: 1.5V peak-to-peak, 75 ohm BNC and terminal strip barrier.</td>
</tr>
<tr>
<td>Power Source</td>
<td>115/230 VAC ± 10%, 50/60 Hz, 10 watts</td>
</tr>
<tr>
<td>Monitoring Capability</td>
<td>One 2&quot; analog meter for monitoring power supplies, 0 to 120% modulation for program and multiplex channels. LED bargraph for monitoring input RF level and modulation 70 to 120%</td>
</tr>
</tbody>
</table>

---
7700 SERIES
BROADCAST QUALITY AURAL
STUDIO TRANSMITTER LINK
AND INTER-CITY RELAYS

For: 35-50 MHz, 143-174 MHz*,
203-240 MHz*, 302-330 MHz,
446-488 MHz, 940-960 MHz

*Customized order
Innovation helps make TFT a performance leader in Studio-Transmitter-Links and Inter-City Relays

TFT designs, manufactures, markets and services Broadcast Quality STL's and Inter-City Relays for Stereo, Monaural, and Multi-Channel program audio applications.

Since the introduction of STL's in 1977, over a thousand units have been installed and operational in the United States and worldwide. This equipment is also frequently used for voice and data transmission where low intermodulation and superior group delays are required. It is the best performing equipment in its price range.

Why STL?

STL represents the best alternative to telephone lines in three important areas:

1. **Quality**: Since telephone lines were designed primarily for voice transmission, their audio quality is minimal. Even the compensated lines are not adequate for most of today's stereo performance requirements. TFT's STL and Inter City Relays, on the other hand, are designed primarily for broadcast and take into account the many specialized requirements of that medium.

2. **Reliability**: With STL you are no longer at the mercy of telephone companies which you cannot control.

3. **Economy**: The cost of telephone lines are increasing. Once you own an STL, level amortization and small maintenance costs are all you pay.

All of these factors make owning an STL both a practical and economically sound decision.

Tone burst test of the STL system demonstrates true signal reproduction with no overshoot. Top trace: 15 kHz tone burst input to the transmitter. Bottom trace: output from the receiver.

Why 7700 Series?

The full fidelity performance of today's HI-FI receivers and tomorrow's AM Stereo receivers has put new requirements on broadcast equipment. The link between the broadcast studio and the transmitter is as important as the broadcast transmitter itself. TFT STL's are designed with broadcast applications in mind using state-of-the-art RF and digital technology. Some of the innovations in the 7700 Series STL include:

- **IF Modulated Transmitter**: Improves signal to noise ratio and stereo performance by providing low distortion and high stereo performance.

- **Hot Standby**: A fully redundant receiver and transmitter are available, both with automatic transfer and alarm, which provides maximum security across the system.

- **Modular Construction**: Modular construction in the transmitter and receiver contribute to low maintenance cost and ease of field servicing.

- **Ease of Maintenance**: All tuning adjustments are easily accessible through top of transmitter and receiver modules. P.C. boards are of slide-out design for easy replacement.

- **Front Panel Metering**: Audio output level, subcarrier level and RF input level in microvolts may all be monitored directly from the front panel.

- **RFI Protected**: In the last five years, the 7700 Series has been field tested in the most adverse environments such as transmitter farms in Houston, Los Angeles, San Francisco and Denver. All have achieved excellent field test results.

- **A Wide Selection of Frequency Ranges**: Provides STL capability for most foreign and domestic systems.

*Field test data and results are available upon request.*
### Specifications

#### System

- **Frequency Ranges**: 35-50 MHz (monaural only), 143-174 MHz*, 203-240 MHz*, 302-330 MHz, 446-480 MHz, and 940-960 MHz.
- **Baseband Frequency Response**: Program Audio: Composite: 50 Hz - 75 kHz, Monaural: 50 Hz - 15 kHz, Multiplex: Composite: 110 to 220 kHz, Monaural: 29 to 67 kHz.
- **Harmonic and Intermodulation Distortion**: Composite: 0.2% at 1 kHz, 0.25% from 30 Hz to 60 kHz, Monaural: 0.2% from 30 Hz to 15 kHz.
- **Receiver Specifications**: Frequency: 35-50 MHz, 450-485 MHz, 300-335 MHz, 35-50 MHz. RF Input Connector: 50 ohm. Sensitivity: 60 dB S/N Min. Signal to Noise: 1 mV RF input without de-emphasis. Spurious Response: Composite: 0.5% in 3 to 10 kHz, ±0.5 dB from 46 to 67 kHz. Crosstalk: Greater than 70 dB. Crosstalk Suppression: Greater than 46 dB.

#### Receiver

- **Temperature Specifications**: Operating: +5°C to +50°C. Storage: -10°C to +50°C. Power Requirements: 10°C to +50°C.
- **Alarm Output (Relay Closure)**: 1 A at 24 VDC, 0.5 A at 115 VAC. Dimensions: 19" (48.3 cm) x 18" (48.3 cm) x 15.5" (39.4 cm) D. Weight: 29 kg (64 lbs).

#### Transmitter

- **Frequency Range (MHz)**: 940-960 MHz. RF Power Output (watts, max): 12, 20, 20, 20, 20. Frequency Stability (ppm/yr): ±0.0001% for 0°C to +5°C, ±0.0005% for -10°C to +5°C. Spurious Signal Suppression: Composite & Monaural (dB): 48, 50, 50, 50, 50. AM Noise (dB below carrier): 65, 65, 65, 65, 65. Pre-Duty for 100% Mod: Composite & Monaural (dB): 12, 12, 12, 12, 12. AC Line Power (watts)**: 70, 150, 150, 200, 200. Dimensions: 5.25" (13.3 cm), 10" (25.4 cm), 13" (33 cm). Weight: 29 kg (64 lbs). Weight (in lb.): 13.1 lbs. **10 k-ohm input. **120-240 VAC. 50-60 Hz.
The Transmitter

The rugged TFT 7700 Series transmitter represents a new approach to STL transmitter design, providing a vast improvement in S/N ratio and frequency stability over conventional systems. Outstanding features include:

Features

- **IF Modulation:** The carrier modulation is applied to an IF frequency between 38 MHz and 48 MHz to achieve excellent signal to noise ratio and stereo performance. The final carrier frequency is obtained by heterodyning the IF against a stable frequency source.

- **High Output Power:** The 12-watt output at 960 MHz (20 watts at 300 MHz) generates more useful signal for long or difficult transmission paths and provides higher fade margins.

- **Adjustable Output:** Power can be adjusted from 3 watts to maximum power output, allowing you to meet your exact requirements.

- **Fully Protected:** The output is fully protected against short circuits and high VSWR.

- **Excellent Frequency Stability:** Frequency synthesized carrier provides frequency stability of ±1 ppm/year as well as making it easier to change operating frequencies in the field.

- **Accommodates Two Additional Subcarriers:** Two FM subcarriers can be inserted in addition to the main and stereo channels.

- **No Subcarrier Beats:** 19 kHz harmonically related subcarrier frequencies are chosen in order to eliminate subcarrier intermodulation products.

Transmitter Block Diagram
The design of the all-new TFT 7700 Series receiver incorporates several unique features that provide low noise, high gain and great versatility. All receivers allow for automatic change-over to stand-by in the event of a detected malfunction.

**Features**

- **Crystal controlled triple conversation superheterodyne design**: This provides selectivity, gain and stability in the receiver.
- **Low Noise RF Amplifier**: A high gain, low noise RF amplifier provides a 3.5 dB noise figure.
- **Pulse-counting Discriminator**: A unique pulse-counting discriminator circuit provides ultra-linear FM demodulation to achieve low harmonic and intermodulation distortion.
- **Receiver Automatic Changeover**: Switching to the hot standby receiver is done automatically if a failure occurs.
- **Remote Operation and Status Check**: Studio engineers can interrogate the receiver over existing remote control equipment to determine receiver change-over and ascertain which receiver is operational. Receiver switching can also be done by remote command.
- **Wide and Narrow Bandwidth IF**: Both wide-band and narrow band IF are available for either composite or monaural applications. Super sharp IF filters are available for 125 kHz channel spacings.
Applications

The broadband characteristics of the TFT 7700 Series STL system allow for many specialized applications beyond the standard aural studio-transmitter link for a composite stereo baseband signal. Among these are:

- **Intercity Relay Systems:** By interconnecting a number of STL systems in series, broadcast quality audio links between cities may be achieved, providing high quality stereo or multi-channel audio service to easy city.

- **Remote Control:** With the addition of an FM subcarrier, 7700 series STL can carry remote control signals from the studio to the transmitter site.

- **SCA Channel:** A background music service or data channel can be transmitted via the 7700 Series STL by using the second FM Subcarrier.

**AM Stereo:** With a TFT designed built-in stereo decoder, the 7700 Series can provide L and R channel output when the transmitter is used in conjunction with a standard FM stereo generator.

A TFT STL Application Guide for equipment selection and path calculations is available upon request.

Accessories & Options

**Model 7770 Transmitter Automatic Change-over:** This is a 1-3/4" rack mount unit which monitors critical parameters in the transmitters. If a fault is detected, it automatically switches to the hot standby transmitter. Change-over can also be accomplished by a front panel switch or relay contact closure in the remote control equipment. The unit is self-powered and switches RF output to the antenna.

**Model 7773 Receiver Automatic Change-over:** Similar to the Model 7770, Model 7773 monitors the parameters in the receivers. The unit switches the program channel output as well as both subcarrier outputs.

**Frequency Division Multiplex (FDM) Baseband Encoder and Decoder:** Multiple broadcast programs can be transmitted within the FDM encoder and decoder. A data sheet for the FDM equipment is available upon request.

**Other Accessories:** TFT carries a full line of accessories such as coaxial cable, type N connectors and antennas to meet STL system installation requirements. Please refer to STL price list for detailed information.

**Stereo Decoder (option 13):** Built-in stereo board for decoding left and right channels. (For AM stereo applications).

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**STL EQUIPMENT SELECTION GUIDE**

<table>
<thead>
<tr>
<th>SYSTEM DESCRIPTION</th>
<th>TRANSMITTERS REQUIRED</th>
<th>RECEIVERS* REQUIRED</th>
<th>RECEIVER OPTION</th>
<th>FOR HOT STANDBY SWITCH</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>A SINGLE COMPOSITE</td>
<td>1</td>
<td>1</td>
<td>AS REQ'D.</td>
<td>AS REQ'D.</td>
</tr>
<tr>
<td>B DUAL COMPOSITE</td>
<td>2</td>
<td>2</td>
<td>AS REQ'D.</td>
<td>AS REQ'D.</td>
</tr>
<tr>
<td>C SINGLE MONOURAL</td>
<td>1</td>
<td>1</td>
<td>AS REQ'D.</td>
<td>AS REQ'D.</td>
</tr>
<tr>
<td>D DUAL MONOURAL</td>
<td>2</td>
<td>2</td>
<td>AS REQ'D.</td>
<td>AS REQ'D.</td>
</tr>
<tr>
<td>E DUAL CHANNEL IN PARALLEL OPERATION</td>
<td>2</td>
<td>2</td>
<td>AS REQ'D.</td>
<td>AS REQ'D.</td>
</tr>
</tbody>
</table>

* All receivers provide a balanced audio output at +10 dB

**Model 7770 includes a power splitter for parallel operation of dual monaural receivers
Standard Mux is 3657 kHz for Monaural signal
110-220 kHz for Composite signal

OPTION: Receivers can be factory equipped with 75 μsec de-emphasis
Receiver Option 10 includes: 15 kHz low pass filter
Receiver Option 11 includes: 24-68 kHz Mux filter amplifier
Receiver Option 12 includes: 12-108 kHz Mux filter amplifier
BROADCAST QUALITY AURAL STUDIO TRANSMITTER LINK AND INTER-CITY RELAY SYSTEM
The Leading Edge of STL Technology

TFT 8300 broadcast quality aural Studio Transmitter Link and inter-city relay opens a new generation of superior STL technology keyed to the increasing demand for system performance and versatility. It is the result of years of experience in STL and FM transmitter monitoring technology. To meet today's demands for improved signal-to-noise ratio, better stereo separation, reliable operation in dense RF signal environments, AM stereo applications and automatic "hot-standby" switch over; these state-of-the-art features are all incorporated into the revolutionary design of the new TFT 8300.

System Features

- **Superior System Performance** — better than 75 dB signal-to-noise ratio, 50 dB stereo separating, three-to-one protection against adjacent channels.
- **Full Front Panel Metering** — Diagnostic metering capabilities facilitate key system performance checks and monitoring.
- **Bargraph Display of Modulation** — A bargraph display is used in both transmitter and receiver for displaying percentage of modulation.
- **Hot Standby** — Fully automatic switch-over to hot-standby receiver or transmitter.
- **Modular Construction** — For low maintenance cost and ease of field servicing.

For Major Market's RF Signal Environment

The 8300 is specifically designed for the major market's RF signal environment where it becomes increasingly difficult to operate composite STLs with the large number of signals present in the 940-960 MHz band. By using the latest technology and components, such as S.A.W. filters, selectable RF front end gain, variable bandwidth IF amplifiers and cast aluminum RF shielded housings for critical circuits, TFT engineers were able to design one of the best STL systems available to the broadcast industry for aural program transmission.

The Transmitter

The RF carrier is generated by a UHF VCO which is phase locked to another VCO operating at an intermediate frequency (IF) of 60 to 80 MHz. Composite modulation is taking place at the IF VCO which is also frequency synthesized to a stable crystal source. Since no multiplier is used in the entire transmitter, the RF carrier is therefore the exact reproduction of the IF VCO.

Features

- **Direct Locked RF Carrier** — RF carrier is directly generated, without multiplication, by a UHF VCO which is phase locked to an IF VCO.
- **IF Modulation** — The carrier modulation is applied to an IF frequency between 60 and 80 MHz to achieve excellent signal-to-noise ratio and stereo performance.
- **Fully Protected** — The output is fully protected against short and open circuits as well as high VSWR.
- **Wide Base Band Bandwidth** — Two additional FM subcarriers can be inserted into the baseband in addition to the main and stereo channels.
The Receiver

The design of the 8300 receiver incorporates several unique features that provide low noise, high gain and great versatility. All receivers allow for automatic change-over to "Hot Standby" in the event of a detected malfunction.

Features

• S.A.W. Filter - Surface Acoustic Wave (S.A.W.) filter is used at the first IF amplifier to provide superior selectivity and, at the same time, to eliminate phase distortion for excellent stereo performance and frequency response.

• Pulse-Counting Discriminator - A unique pulse-counting discriminator circuit provides ultra-linear FM demodulation to achieve low harmonic and intermodulation distortion.

• Selectable IF Bandwidth - Two IF bandwidths are available, depending on signal conditions. The wide band is used in normal environment operation and the narrow band is used where adjacent channel interference is high.

• Hi-Low Gain RF Amplifier - A selectable HI or LOW gain RF amplifier protects the amplifier from being overdriven by strong input signals.

Applications

• Dense RF Environment - Designed to meet the stringent requirements of top-market stations which are located in congested RF environments.

• Inter-City Relay Systems - By interconnecting a number of STL systems in series, broadcast quality audio links between cities may be achieved, providing high quality stereo or multi-channel audio service to each city.

• Multiple Program Channels - Superior TFT 8300 performance allows the use of FM subcarriers or FDM in addition to the composite stereo signal. (Sub-channel audio can respond to 15 KHz.)

• AM Stereo - With a TFT designed built-in stereo decoder, the 8300 can provide L and R channel output when the STL transmitter is used in conjunction with a standard FM stereo generator.

Accessories and Options

92 kHz SCA Capability (option 16): Allows the 8300 System to transmit a 92 kHz SCA channel through the entire STL System (SCA generator located at studio). Consult factory for full details and specifications.

Stereo Decoder (option 15): Built-in stereo board for decoding left and right channels. (For AM stereo applications).

Model 7770 Transmitter Automatic Changeover: This is a 1 1/4" rack mount unit which monitors critical parameters in the transmitters. If a fault is detected, it automatically switches to the hot standby transmitter. Change-over can also be accomplished by a front panel switch or relay contact closure in the remote control equipment. The unit is self-powered and switches RF output to the antenna.

Model 7773 Receiver Automatic Change-over: Similar to the Model 7770, Model 7773 monitors the parameters in the receivers. The unit switches the program channel output as well as both subcarrier outputs.

Frequency Division Multiplex (FDM) Baseband Encoder and Decoder: Multiple broadcast programs can be transmitted with full audio bandwidth by using the FDM encoder and decoder. A data sheet for the FDM equipment is available upon request.

Other Accessories: TFT carries a full line of accessories such as coaxial cable, type N connectors and antennas to meet STL system installation requirements. Please refer to STL Price Schedule for detailed information.
## Specifications

### System
- **Frequency Range**: 940-960 MHz standard
- **Frequency Response**: ± 1 dB or better 30 Hz to 53 kHz
- **Distortion (THD & IMD)**: 0.2% or less 30 Hz to 53 kHz
- **Stereo Separation**: 50 dB or better, 50 Hz to 15 kHz
- **Stereo Subchannel to Main Channel Crosstalk**: 50 dB or better
- **Main Channel to Stereophonic Subchannel Crosstalk**: 50 dB or better
- **Signal-to-Noise Ratio**: 75 dB or better below 100% modulation de-emphasized

### Transmitter
- **RF Power Output**: 4 Watts minimum, 14 Watts maximum
- **RF Output Connector**: Type N Female, 50 ohms
- **Deviation for 100% Modulation**: ± 50 kHz
- **Frequency Stability**: Better than 0.0001%, 0°C to 50°C
- **Spurious and Harmonic Emission**: 60 dB or more below carrier level
- **Modulation Capability**: One Stereo Composite Program and Two Subcarrier Channels.
- **Modulation Inputs**: Composite: 3.5V peak to peak, 10K ohms balanced and unbalanced, BNC and terminal strip.
  - Multiplex: 1.5V peak-to-peak, 10K ohms BNC, (2 each), frequency range 130 to 300 kHz
- **Power Source**: 115/230 VAC ± 10%, 50/60 Hz, 80 Watts
- **Monitoring Capability**: One 2” analog meter for monitoring power output power supply, bias voltages, multiplex and program modulation. LED bargraph for monitoring 70 to 120% program channel modulation.

### Receiver
- **RF Input Connector**: Type N Female, 50 ohm
- **Sensitivity**: 30uV or less required for 60 dB SNR broadband, de-emphasized. 100uV or less required for 60 dB SNR left or right channel demodulated.
- **Selectivity (wide)**: 3 dB IF bandwidth ± 200 kHz
  - 60 dB IF bandwidth ± 700 kHz
  - 80 dB IF bandwidth ± 1.2 MHz
- **Selectivity (narrow)**: 3 dB IF bandwidth ± 150 KHz
  - 60 dB IF bandwidth ± 500 kHz
  - 80 dB IF bandwidth ± 1.2 MHz
- **Modulation Outputs**: Composite: 3.5V peak-to-peak, 75 ohm balanced and unbalanced, BNC and clip lead.
  - Multiplex: 1.5V peak-to-peak, 75 ohm BNC and terminal strip barrier.
- **Power Source**: 115/230 VAC ± 10%, 50/60 Hz, 10 watts, 24 VDC optional
- **Monitoring Capability**: One 2” analog meter for monitoring input RF level and modulation 70 to 120%

### Represented by:

![Represented by:](image-url)
FEATURES

- Three major sub-systems in one package:
  - Frequency-Agile RF Pre-Selector
  - Baseband Demodulator
  - Stereo Demodulator
- Complete Stereo Measurements:
  - L + R, L - R, Pilot, 38 kHz, L, R
  - SNR, Phase, AM Noise, Multipath
- Built-in Frequency-Synthesized Type Modulation Calibrator
- Exclusive Peak Modulation Duration Differentiator and Counter (P.M.D.D. ™)
- Carrier & Pilot Frequency Measurement via front panel connector

GENERAL DESCRIPTION

To maximize your FM station’s market coverage, TFT designed the Model 844 FM Stereo Modulation Monitor to help you reach all of your listeners—especially those in fringe areas with maximum allowable modulation levels.

The Model 844 can be used for off-air monitoring of modulation level or for direct transmitter Proof-of-Performance measurements. To accommodate all U.S. and International broadcast standards, the 844 Monitor features a two channel frequency-synthesized pre-selector having 50 kHz tunable steps.

For remote meter reading and peak flasher display, an optional panel with peak flashers and meters is available (see Options).

COMPLETE STEREO MEASUREMENTS

The 844 makes complete measurements of total modulation, Right channel modulation, Left channel modulation, channel separation, Main and Sub-channel crosstalk, L + R, L - R, 38 kHz carrier suppression and 19 kHz injection level. All measurements can be made with front panel push-buttons and are read on a large test meter.

COMPETITIVE MODULATION COMPARISON

Because the 844 is equipped with two digitally tunable RF pre-selectors, you can precisely select any one of two FM stations. This feature gives you a quick, easy way to check on how your modulation compares with other stations in your market.

PLL STEREO

The 844 provides superior stereo separation measurements. The phase-locked-loop (PLL) regenerates the 38 kHz carrier from the 19-kHz pilot carrier. This technique ensures precise accuracy and long-term stability of the phase relationship between the transmitter’s pilot carrier and the regenerated 38 kHz subcarrier and therefore provides superior stereo demodulating characteristics. This also eliminates the need for phase adjustment during stereo measurements.

(continued—over)
SIMULTANEOUS L & R MONITORING

Two separate meters permit simultaneous monitoring of Left and Right channel modulation. A third meter provides Total modulation readings. The Left meter also acts as the Test Meter.

LOWEST T.H.D. & SNR

The 844 utilizes a pulse-counting FM discriminator to optimize frequency-to-voltage conversions. Consequently, the total harmonic distortion is less than 0.1% and the signal-to-noise ratio is better than 80 dB.

SCOPE OUTPUTS

BNC connectors are provided on the front panel to monitor the demodulated signals under test. The signals can be fed to external test equipment such as an oscilloscope. For example, the phase relationship of the Left and Right channels can be observed and/or adjusted with the use of these front panel connections.

FREQUENCY-SYNTHESIZED TYPE MODULATION CALIBRATOR

A frequency synthesized type FM modulation calibrator is built-in for calibration of the modulation meters and peak flashers. The highest stability and accuracy are achieved with crystal oscillators which remain stable well within the required accuracy regardless of temperature or age. No external equipment is required to use the modulation calibrator. Accuracy exceeds 1.0 percent, year after year. This feature eliminates the need for Bessel Null calibration.

I.F. BANDWIDTH SELECTION

The appropriate bandwidth is automatically selected when changing between off-air monitoring and on-site measurements. This feature eliminates bandwidth restrictions for Proof-of-Performance measurements.

ACCURATE PEAK DETECTION—P.M.D.D.™

The 844 includes the exclusive, Peak Modulation Duration Differentiator (P.M.D.D.). This feature is incorporated into a peak modulation detecting circuit to identify true modulation peaks and distinguish them from other peaks caused by transient noise, overshoot and multipath distortion. Only those peaks which exceed user-set values for modulation and duration will trigger the 844’s P.M.D.D. peak flashers (simultaneous positive and negative modulation). A large LED display indicates the number of peaks per minute and is refreshed every sixty seconds.

ADJUSTABLE PEAK FLASHERS

Dual LED Peak Flashers may be adjusted over a broad range: 50% to 199% modulation. A thumbwheel-type switch eliminates the ambiguity and imprecision of potentiometer type controls.

BUILT-IN VOLTOMETER & ATTENUATOR

For low-level modulation and noise measurements, a switchable 50 dB attenuator is built-in (10 dB steps). To perform a complete Proof, the only other equipment you need is a distortion analyzer and an audio generator.

DIRECT AM NOISE MEASUREMENTS

A convenient front panel switch allows you to use the 844 for direct measurement of incidental and residual AM on your transmitted carrier. The dynamic range of this measurement is 75 dB from 100% modulation.

SWITCHABLE DE-EMPHASIS

When measuring AM or low-level noise and modulation, a 75 μsec de-emphasis circuit can be easily switched into the meter circuit. Other time constants are available on request.

BUILT-IN MULTIPATH DETECTOR

When monitoring off-air, multipath can be read on the test meter so you can properly orient the monitor’s receive antenna for maximum signal and minimum multipath interference.

Companion 3-Channel SCA Monitor, Model 845. See separate brochure.
FM Stereo Modulation Monitor

Model 804 Remote Meter Panel.
This rack mount panel (19" × 5 1/4") duplicates the peak flashers and meters on the 844's front panel. 50 feet of cable is provided.
TFT Part number: 5116-0804.

Option 01
Absence of Modulation Alarm & Carrier-Fail Alarm

844 FM STEREO MONITOR BLOCK DIAGRAM

OPTIONS

The Absence of Modulation Alarm is triggered when the composite signal drops below 30% modulation. Time is user-adjustable between 2 seconds and 1 minute.
The Carrier-Fail Alarm is triggered when the RF carrier drops below 50% of nominal.
TFT Part Number: 7100-3870.

SPECIFICATIONS

RF SECTION

Frequency Range .................. 88-108 MHz, tunable in 50 kHz steps
High Level Transmitter
RF input voltage .................. 1 to 10 volts RMS
Antenna input voltage & impedance 250 μV to 100 mV; 75 ohms, BNC
Tuning ................................ Two 4-digit thumbwheel switches and a pushbutton switch for selecting station A or station B.
AGC range .................. 60 dB
Composite Input .................. 3.5 v P-R 1.0 k ohms potentiometer, BNC.

(specifications continued—over)

MODULATION METER, TOTAL

Deviation for 100% indication .................. ± 75 kHz, peak-to-peak.
Meter Range .......................... 0 to 133% modulation.
AC voltmeter range .................. 0 to −50 dB in 10 dB steps.
Accuracy (5 kHz tone) .................. ± 2% at all modulation levels.
Frequency Response .................. ± 0.01 dB typical, from 50 Hz to 75 kHz; ± 0.5 dB max from 30 Hz to 120 kHz.

MODULATION METER, RIGHT

Right channel modulation .................. Indicates and measures right channel modulation.
Frequency Response .................. ± 0.25 dB, 50 Hz to 15 kHz.
MODULATION METER, LEFT/TEST

Left channel modulation .......... Indicates and measures left channel modulation.
Right channel modulation .......... Same as right modulation meter.
Total Modulation .......... Same as total modulation meter.
L + R .......................... ± 0.25 dB, 50Hz to 15 kHz
L - R .......................... ± 0.35 dB, 23 kHz to 53 kHz
Pilot Level & 38 kHz level .......... Measures down to - 60 dB.
Phase Calibration .......... For optimization of stereo measurements.
AM Noise .......... Measures transmitter AM noise down to - 75 dB from 100% modulation.
Multipath indicator .......... For adjustment of antenna to minimize multipath distortion.

PEAK MODULATION INDICATORS

Deviation for 100% indication .......... ± 75 kHz
Peak Level .......... Set by a front panel 3-digit thumbwheel switch in 1% steps from 50% to 199% on both positive and negative peaks.
Accuracy (5 kHz tone) .......... ± 1% at 100% modulation
Frequency Response .......... ± 2% from 30 Hz to 120 kHz.
Response Time Accuracy .......... Adjusted, 10 cycles of 10 kHz or faster.
Peak Counter .......... Registers number of true peaks of modulation per minute.

MODULATION CALIBRATOR

Built-in frequency synthesized calibrator for meter and peak flasher calibration of 100% modulation (± 75 kHz) from the front panel. Accuracy, ± 0.5%.

OUTPUTS, FRONT & REAR PANEL

Main channel output with 75 µsec de-emphasis .......... 5 volts RMS into 5K ohms at 400 Hz.
*Signal-to-Noise Ratio .......... 78 dB at 400 Hz with de-emphasis.
*Harmonic Distortion .......... 0.1% max (de-emphasized).
*Intermodulation Distortion .......... 0.1% max per SMPTE standard.

Balanced audio output level .......... 0 dBm into 600 ohms.
*Balanced audio Frequency Response .......... ± 0.5 dB from 30 Hz to 120 kHz.
Composite output for SCA Monitor .......... 1 volt RMS into 600 ohms.
Pilot carrier (19 kHz) .......... 600 mV RMS, available on front panel.
Composite .......... 5 VRMS, 10k ohms at 100% modulation.
Connectors .......... BNC
Meter output .......... Main meter selected signal available on front panel.
Carrier-fail Alarm (option) .......... Relay drive output capable of sinking 50 mA at 30 VDC when RF carrier drops below 50% of nominal.
Absence of Modulation Alarm (option) .......... An output capable of sinking 50 mA at 30 VDC when composite signal drops below 30% modulation for a period of time between 2 seconds and 1 minute, internally adjustable.

STEREO SEPARATION AND CROSSTALK

Separation:
L to R & R to L .......... 60 dB typical, 55 dB minimum, 50 Hz to 15 kHz.

Crosstalk:
(L + R) to (L - R) or,
(L - R) to (L + R) .......... 65 dB minimum.

Crosstalk:
SCA to (L + R) or,
SCA to (L - R) .......... 70 dB minimum.
Pilot carrier measurement level accuracy .......... ± 0.5% from 6% to 12% injection.

MECHANICAL AND ENVIRONMENTAL

Input power .......... 115/230 VAC, ± 10%, 50 to 400 Hz, 40 watts maximum.
Operating Temperature .......... 0° C to 50° C (32° F to 122° F).
Size and Net weight .......... 19" (48.26 cm) Wide × 7" (17.78 cm) High × 15" (3810 cm) Deep, 18.5 lbs. (8.4 kg) net.

Contents subject to change without notice.
# DOMESTIC PRICE LIST
## RADIO MONITORING EQUIPMENT

**Effective 16 May 88**

## FM PRODUCTS

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Suggested List Price (U.S. Dollars)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL 844</strong> (5116-0844)</td>
<td>FM BASEBAND/STEREO MODULATION MONITOR includes Absence of Modulation/Carrier Fail Alarm (75 µsec de-emphasis supplied standard.)</td>
<td>$4,425.00</td>
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<tr>
<td>Option 02 (7100-3890)</td>
<td>Spare Parts Kit</td>
<td>$475.00</td>
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<tr>
<td><strong>MODEL 804</strong> (5116-0804)</td>
<td>REMOTE METER AND PEAK FLASHER PANEL FOR MODEL 844</td>
<td>$525.00</td>
</tr>
<tr>
<td><strong>MODEL 884</strong> (5116-0884)</td>
<td>FM BASEBAND/STEREO MODULATION MONITOR (75 µsec de-emphasis supplied standard)</td>
<td>$3,200.00</td>
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<tr>
<td><strong>MODEL 845</strong> (5116-0845)</td>
<td>3-CHANNEL SCA MODULATION MONITOR, 67 kHz supplied standard</td>
<td>$2,325.00</td>
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<tr>
<td>Option 01 (7100-3880)</td>
<td>RF Module-Preselector (Specify frequency)</td>
<td>$750.00</td>
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<tr>
<td>Option 02 (7100-3900)</td>
<td>SCA Channel (41 kHz)</td>
<td>$250.00</td>
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<tr>
<td>Option 03 (7100-3910)</td>
<td>SCA Channel (92 kHz)</td>
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<tr>
<td>Option 04 (7100-3920)</td>
<td>Spare Parts Kit</td>
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<tr>
<td><strong>MODEL 805</strong> (5116-0805)</td>
<td>REMOTE METER AND PEAK FLASHER PANEL FOR MODEL 845</td>
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## AM PRODUCTS

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Suggested List Price (U.S. Dollars)</th>
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<tr>
<td><strong>MODEL 753</strong> (5116-0753)</td>
<td>AM MODULATION MONITOR</td>
<td>$1,600.00</td>
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<tr>
<td>Option 02 (7100-2440)</td>
<td>Carrier Power Alarm</td>
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<td>Option 03 (7100-2410)</td>
<td>10 kHz Whistle Filter</td>
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<tr>
<td>Option 04 (7100-2420)</td>
<td>30 Hz Telemetry Lowpass Filter</td>
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<tr>
<td>Option 05 (7100-2430)</td>
<td>Absence of Modulation Alarm</td>
<td>$315.00</td>
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<tr>
<td>Option 06 (7100-2460)</td>
<td>230 VAC</td>
<td>$60.00</td>
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<tr>
<td>Option 07 (7100-2560)</td>
<td>Spare Parts Kit</td>
<td>$245.00</td>
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<tr>
<td><strong>MODEL 755A</strong> (5116-0755A)</td>
<td>AM RF PRESELECTOR (TUNABLE IN 1kHz INCREMENTS)</td>
<td>*$1,680.00</td>
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<tr>
<td>Option 01 (7100-2470)</td>
<td>Narrow Band Filter</td>
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<td>Option 04 (7100-2500)</td>
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<td><strong>MODEL 704E</strong> (5116-704E)</td>
<td>REMOTE METER AND PEAK FLASHER PANEL FOR MODEL 753</td>
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* Not field installable
# EBS PRODUCTS

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<tr>
<th>MODEL</th>
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<tr>
<td>760-1A (5116-760-1A)</td>
<td>TUNABLE AM RECEIVER/ENCODER/DECODER</td>
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<td>760-1B (5116-760-1B)</td>
<td>SINGLE CHANNEL FM RECEIVER/ENCODER/DECODER</td>
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<td>Specify one receive frequency</td>
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<tr>
<td>760-1C (5116-760-1C)</td>
<td>DUAL CHANNEL FM RECEIVER/ENCODER/DECODER</td>
<td>$1,735.00</td>
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<td>Specify two receive frequencies</td>
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<td>8010 (5116-8010)</td>
<td>FM E-ALERT RECEIVER, Specify frequency</td>
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<tr>
<td>8020 (5116-8020)</td>
<td>AM E-ALERT RECEIVER, Specify frequency</td>
<td>$275.00</td>
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## TERMS OF SALE

All shipments are made F.O.B. Santa Clara, California. Terms are net 30 days to customers who have a satisfactory established line of credit with us. Others should arrange with the factory for payment at the time of shipment.

## WARRANTY

TFT, Inc. warrants each of the instruments of its manufacture to be produced to meet the specifications delivered to the BUYER; and to be free from defects in material and workmanship; and will repair or replace at its expense, for a period of one year from the date of delivery of equipment, any parts which are defective from faulty material or workmanship. Equipment, accessories, tubes and batteries not manufactured by TFT are subject to only such warranties as those listed by the manufacturer.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charge prepaid by the BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER, prior to such returns. Upon examination by the factory, if the instrument is found to be defective, the unit will be repaired and returned to the BUYER, with transportation charge prepaid by SELLER.

Transportation charges for instruments found to be defective within the first thirty (30) days of warranty period will be paid both ways by the SELLER.

Transportation charges for warranty returns and repair costs, wherein failure is found not to be the fault of the SELLER, shall be paid both ways by the BUYER.

This warranty does not apply to instruments which, in the opinion of the SELLER, have been altered or misused. No other warranty is expressed or implied. SELLER SPECIFICALLY EXCLUDES AND DISCLAIMS ANY WARRANTY FOR FITNESS OR PURPOSE AND MERCHANTABILITY. IN NO EVENT SHALL SELLER BE RESPONSIBLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES.

## CONTENTS SUBJECT TO CHANGE WITHOUT NOTICE
All of TFT’s fine radio products are available from:

<table>
<thead>
<tr>
<th>State</th>
<th>City</th>
<th>Company</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Louisiana:</td>
<td></td>
<td>Audiomedia Associates</td>
<td>(504) 586-0140</td>
</tr>
<tr>
<td>Maine:</td>
<td></td>
<td>Nautel Maine</td>
<td>(207) 947-8200</td>
</tr>
<tr>
<td>Massachusetts:</td>
<td></td>
<td>Landy Associates Inc.</td>
<td>(617) 890-6325</td>
</tr>
<tr>
<td>Maryland:</td>
<td></td>
<td>Bradley Broadcast Sales</td>
<td>(301) 948-0650</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Radio Resources</td>
<td>(301) 859-1500</td>
</tr>
<tr>
<td>Michigan:</td>
<td></td>
<td>Dyer Electronics</td>
<td>(313) 349-7910</td>
</tr>
<tr>
<td>Minnesota:</td>
<td></td>
<td>Emmons Associates</td>
<td>(612) 890-8920</td>
</tr>
<tr>
<td>North Carolina:</td>
<td></td>
<td>EME, Inc.</td>
<td>(919) 869-3335</td>
</tr>
<tr>
<td>New Jersey:</td>
<td></td>
<td>Holzberg Associates, Landy Associates, Inc.</td>
<td>(201) 530-8555 (609) 424-4660</td>
</tr>
<tr>
<td>New Mexico:</td>
<td></td>
<td>Dyma Engineering</td>
<td>(800) 222-3962</td>
</tr>
<tr>
<td>New York:</td>
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<td>Northeast Broadcast Lab</td>
<td>(518) 793-2181</td>
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<tr>
<td>North Carolina:</td>
<td></td>
<td>SCMS</td>
<td>(704) 889-4508</td>
</tr>
<tr>
<td>Oregon:</td>
<td></td>
<td>Norcom</td>
<td>(503) 632-7488</td>
</tr>
<tr>
<td>Pennsylvania:</td>
<td></td>
<td>Radio Systems, Inc.</td>
<td>(215) 356-4700 (717) 655-5937</td>
</tr>
<tr>
<td>Puerto Rico:</td>
<td></td>
<td>Turabo Radio</td>
<td>(809) 744-3131</td>
</tr>
<tr>
<td>Texas:</td>
<td></td>
<td>Crouse-Kimzey Company</td>
<td>(817) 737-9911 (713) 774-3314 (817) 481-7221 (817) 483-7474</td>
</tr>
<tr>
<td>Utah:</td>
<td></td>
<td>Media-West, Inc.</td>
<td>(801) 295-3308</td>
</tr>
<tr>
<td>Virginia:</td>
<td></td>
<td>Old Dominion Bdcst Eng. Svc.</td>
<td>(804) 321-4506</td>
</tr>
<tr>
<td>Washington:</td>
<td></td>
<td>Broadcast Supply West</td>
<td>(800) 426-8434</td>
</tr>
<tr>
<td>Wisconsin:</td>
<td></td>
<td>Electronic Industries Inc.</td>
<td>(414) 235-8930</td>
</tr>
<tr>
<td>Canada:</td>
<td></td>
<td>MSC Electronics (All Provinces)</td>
<td>(416) 731-9500 (604) 872-8525</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nortec West (Western Provinces)</td>
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</tbody>
</table>

All offices of:  

Allied Broadcast  
Continental Electronics  
Harris Corporation  
RF Specialties

Arizona:  
Spencer Broadcast, Inc.

California:  
Barrett Associates Inc.  
Elcom/Bauer  
Kidd Communications, Inc.  
Marcom

Colorado:  
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Broadcast General Store  
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Canada:  
MSC Electronics (All Provinces)  
Nortec West (Western Provinces)

TFT Inc.  
3090 Oakmead Village Drive, P.O. Box 58088  
Santa Clara, California 95052-8088  
Tel: (408) 727-7272  Telex: 910-338-0584  
FAX: (408) 727-5942
Precision AM Modulation Monitor and Tunable RF Preselectors

MODEL 753
MODEL 754
MODEL 755

MODULATION MONITOR
- Linear phase filter eliminates transient overshoot.
- Built-in meter amplifier/attenuator for noise measurements.
- Modulation meter and peak flashers calibrate automatically over a ±40% carrier level change.
- Separate digital flasher for 100% negative modulation peaks and 25% positive modulation peaks.
- Built-in -100% and +125% modulation calibrators.
- FCC Type Approval No. 3-234

RF PRESELECTORS
- Frequency synthesized digital tuning.
- Digital read-out of carrier frequency deviation (Model 754 only).
- Unique IF filter design for optimum off-the-air monitoring.
EXTENDS COVERAGE POTENTIAL

The Model 753 ultra-accurate broadband AM Modulation Monitor is designed for direct connection to the RF transmission line at the transmitter site. It is designed with linear-phase filter to eliminate transient overshoot in the filter due to the heavy amplitude clipping in today's audio limiters. A built-in 50-dB meter attenuator in 10-dB steps is provided for proof-of-performance measurements. Both Modulation Meter and peak flashers are self calibrated to maintain their accuracy over a ±40% carrier level change. In addition to the fixed +125% and -100% peak modulation lights, a variable peak indicator light settable by a front panel thumbwheel switch is provided to measure peak modulation up to 150% in 1% increments. The ambiguities in peak light settings are eliminated because of the use of the digital thumbwheel switch. Two separate peak modulation calibration points, +125% and -100%, are provided by generating an internal RF signal modulated with asymmetrical peaks for calibrating the entire instrument directly from the input. The Model 753 is competitively priced and it allows you to achieve maximum transmitter modulation to the outer limits.

Optional features include Carrier Power Level Alarm, Absence of Modulation Alarm, Balance Audio Output, 10-kHz whistle filter, 35-Hz low pass filter for subaudio telemetry. The Model 753 is fully adaptable for Automatic Broadcast Transmission System (ATS) applications.

EXTENDS MONITORING CAPABILITY

By adding the Model 754 Preselector, broadcast stations, consultants, and regulatory agencies can pre-tune any AM stations via thumbwheel switches and

MODEL 753 BLOCK DIAGRAM

ACCESSORY

Model 754, RF Preselector/Frequency Control off the air.

Model 755, RF Preselector, for monitoring.

Model 704E, Remote Meter and Peak Flashers and peak flashers at a remote location. 5C.

Model 735, WWV Receiver, for calibrating National Bureau of Standards by comparing frequencies; 10, 15 or 20 MHz.
monitor any one of four stations' modulation and carrier frequency off-the-air by push-button switch selection. A temperature compensated crystal oscillator (TCXO) time base is used in the frequency synthesized local oscillator circuit to achieve a ±2 Hz per year aging accuracy. Additionally, a patent pending design is used in the IF amplifier which offers sharp selectivity as well as negligible overshoot in off-the-air monitoring application when it responds to clipped audio signals.

The Model 755 is essentially the same as Model 754 without the frequency measurement capability. By selecting the TCXO time base option, the model 755 IF output jack at the rear panel can be used to monitor carrier frequency with an external frequency counter having an accurate time base. There is only one set of thumbwheel switches on the Model 755 front panel instead of four.
MODEL 753 Precision AM Modulation Monitor

RF Input
Frequency Range ............... 500 kHz to 4 MHz*
Level Range .................. 1V to 10V RMS
Impedance, nominal ......... 50 ohms

MODULATION METER
Meter Range .................. 0 to 133%, switchable “+” or “-”
Attenuator Range .............. 0 to -50 dB in 10 dB steps
Accuracy .................... At 100% Mod. 400 Hz .. ±2%
Frequency Response ............ ±5% at 400 Hz
30 Hz to 25 kHz ............ ±5%

PEAK MODULATION INDICATORS
-100% Indicator ............... Internally set to flash when modulation exceeds 99%
Accuracy .................... ±1% at 400 Hz
Frequency Response ............ ±5%, 20 Hz to 25 kHz
+125% Indicator ............... Internally set to flash when modulation exceeds 125%
Accuracy .................... ±1% at 400 Hz
Frequency Response ............ ±5%, 20 Hz to 25 kHz
Peak Indicator ............... 30% to 150% switchable positive or negative peaks
Accuracy .................... ±2% at 400 Hz
Frequency Response ............ ±5%, 20 Hz to 25 kHz

AUDIO OUTPUTS
Audio Monitor Output
Impedance ................. 600 ohms, unbalanced
Level .................. 0 dBm, 600 ohms
THD, 99% Modulation
400 Hz .................. 0.15% typical, 0.25% max.
Signal-to-noise Ratio ....... ≥75 dB below 100%
Transient Response ...... ≤1% overshoot
Remote Flasher Output to drive Model 704E

Audio Output ............... 5 V RMS into 5k ohms
THD, 99% Modulation,
400 Hz .................. 0.15% typical, 0.25% max.
Signal-to-noise Ratio ....... ≥75 dB below 100%
Transient Response ...... ≤1% overshoot
Remote Flasher Output ...... 0.5 dB, 20 Hz to 25 kHz

CARRIER FAIL OUTPUT .... Indicates loss of carrier by sinking a maximum 30 V, 50 mA load to ground. Open collector output is normally “OFF” when carrier is present.

MODULATION
Calibrator ............... Built-in-calibrator generates a -100%, +125% modulated carrier which is automatically switched into the detector input by the “CAL” button.
Accuracy .................... ±1%

OPTIONS
01 - Balanced Audio Monitor Output ............... 0 dBm, 600 ohms balanced
02 - Carrier Power Alarm ........ Activates Carrier Fail Output when the carrier changes by more than 5%, -10%.
FM Monitors for Frequency and Modulation, Modulation Only, Stereo and SCA

- Built-in, off-the-air capability
- Frequency accuracy of 100 Hz per year
- Complete proof-of-performance measurements
- Alarm and logging outputs for remote control
- Phase-locked loop in stereo demodulator
- Precision crystal filters for SCA measurements
TFT baseband monitors are superheterodyne receiver/monitors using advanced design and construction techniques. Two models are available: frequency and modulation (Model 723) and modulation only (Model 734). Stereo and/or SCA monitoring can be added to either one.

Although both instruments are optimized for off-the-air monitoring (250 microvolt sensitivity), they also provide high-level RF inputs for direct connection to the FM transmitter.

In off-the-air applications, there's no need for an RF amplifier. This results in an exceptionally clean demodulated signal.

Both models have a quasi-peak-reading modulation meter, and digitally-settable peak flashers which display plus and minus modulation peaks simultaneously. Flasher limits are adjustable from 50% to 129% in 1% increments, and are set by front-panel thumbwheel switches. This eliminates ambiguities common to potentiometer-type controls.

The high accuracy and resolution of the peak flashers provides indication of, and protection against, overmodulation. Calibration of the meter and peak flashers may be checked at any time with a high accuracy, pushbutton-activated modulation calibrator which generates a precise, ±75 kHz signal derived from crystal oscillators. A 60-dB AGC range prevents overload in the IF amplifier, and ensures uniform gain and phase characteristics important to stereo monitoring.

Additional features include a carrier-off alarm, and an AM detector output for AM signal-to-noise measurements. Installation is fast and straightforward with no tuning or tweaking necessary.
timized for Remote Control

Model 723 Frequency and Modulation Monitor

The top-of-the-line in FM baseband monitors, Model 723 provides both carrier frequency error display and modulation measurement in a single, state-of-the-art instrument. Complete proof-of-performance measurements at the FM transmitter are easily accomplished, and the accuracy of the 723 exceeds FCC requirements.

For example, Model 723 uses a 5-MHz master oscillator with an aging rate of less than 1 ppm/year at the carrier frequency. This eliminates the need for individual channel crystals, and reduces the number of frequency calibrations per year. This stability is accomplished by synthesizing the local oscillator from the oven-controlled, 5-MHz oscillator. So, users can be assured of accuracy at all times, and save the cost of frequent outside calibration services.

An outstanding advantage of Model 723 is the flexibility of its digital display. Carrier frequency error is shown on a 6-digit readout. At the push of a button, the display can be converted to a 10 MHz, general purpose frequency counter. The Model 724 Stereo Monitor pilot frequency and the Model 730 SCA Monitor sub-carrier frequency can also be measured and displayed on this versatile monitor.

Model 723 can also be rapidly calibrated against the National Bureau of Standards, using the TFT Model 735 Standard Time and Frequency Receiver. A 1-MHz signal, counted down from the master oscillator, is available at the front panel of the Model 723 for this purpose. This method meets the FCC requirements for frequency calibration.

Model 734 FM Modulation-Only Monitor

This economical, easy-to-use instrument meets the minimum FCC requirements for FM modulation monitoring. Model 734 provides no carrier frequency-error measurement or display. However, an optional Carrier Frequency Output allows bringing the RF carrier out to the front panel for connection to an external frequency counter.
Model 724 Stereo Monitor

Used with either Model 723 or Model 734, Model 724 meets all stereo monitoring and proof-of-performance measurement requirements specified by the FCC. Power for the 724 is supplied by the baseband monitor.

Superior separation measurements are achieved by the use of a phase-locked-loop to regenerate the 38-kHz suppressed carrier from the 19-kHz pilot carrier. Excellent accuracy and long-term stability of the phase relationship of the two signals results. Computer-designed filters ensure accurate crosstalk measurements.

Two separate meters monitor left and right channel modulation simultaneously. The right channel meter is also used to indicate channel separation, crosstalk between main and sub-channels, 38-kHz carrier suppression, and 19-kHz injection levels. Measurement modes are selected with convenient front panel pushbuttons. A 50-dB pushbutton attenuator is also included to help make these measurements. Pilot carrier frequency can be measured by the 6-digit counter on the Model 723 baseband monitor or by an external frequency counter via a rear panel connector on Model 724.

OPTIONS FOR MODEL 723

Automatic Logging Output (BCD): The 6-digit frequency display is brought out to the rear panel in parallel BCD form, capable of driving standard DTL and TTL loads.

Automatic Logging Output (Analog): The digital frequency display is converted to analog and brought out to the rear panel. Voltage range of ±1 volt represents carrier frequency error of ±1 kHz.

Off-Frequency Alarm: Closes a relay contact when carrier frequency error exceeds limits of ±1 kHz. Alarm for other frequency limits also available on special order.

Absence-of-Modulation Alarm: Closes a relay contact when modulation is lost. Adjustable response time from 2 to 60 seconds.
ability and Convenience

Model 730 SCA Monitor

The Model 730 can be used with either baseband unit for monitoring SCA transmission characteristics: injection level, modulation, signal-to-noise ratio and crosstalk. The baseband signal is up-converted to 10.7 MHz. Then the SCA sub-channel is extracted through precision crystal filters. This technique ensures accurate measurements. Convenient, front panel push-button switches select measurement modes; a 50-dB push-button attenuator (similar to Model 724) helps make these measurements.

For true SCA proof-of-performance measurements (at the transmitter), a wideband input is provided. It allows unrestricted distortion and response measurements.

Additionally, SCA subcarrier frequency may be measured by the 6-digit frequency counter in the Model 723 baseband monitor, or by an external frequency counter. Monitoring of the 67 kHz sub-channel is standard. Additionally, an optional crystal is available for monitoring the 41 kHz sub-channel. Frequency deviation of either ±4 kHz or ±6 kHz modulation is pushbutton selectable.

Like the baseband monitors, the Model 730 has plus and minus peak flashers which can be digitally set from 50% to 129% in 1% increments. The accuracy of the peak flashers, and the modulation meter, can be checked at any time using the internal precision calibration signal.

OPTIONS FOR MODEL 734

Absence-of-Modulation Alarm: Closes a relay contact when modulation is lost. Adjustable response time from 2 to 60 seconds.

Carrier Frequency Output: The RF carrier is extracted from the input signal and brought to the front panel.

ACCESSORIES

Model 704B Remote Meter and Peak Flasher Panel: For use with baseband monitors, Model 723 or Model 734; or SCA Monitor, Model 730. Duplicates modulation meter and peak flashers. Includes 50' cable. 19" x 5½" panel.

Model 704C Remote Meter and Peak Flasher Panel: For use with Stereo Monitor, Model 724. Duplicates left and right channel modulation meters. Includes 50' cable. 19" x 5½" panel.

**SPECIFICATIONS**

Model 723 FM Frequency and Modulation Monitor
Model 734 FM Modulation Only Monitor

The following are common to both instruments:

**RF INPUT**
- Frequency Range: 88 to 108 MHz (other freq. on special order)
- Low Level RF Input: 250 µV to 250 mV, 75 ohms, 60 dB AGC range
- High Level RF Input: 1V to 10V, 50 ohms
- Selectivity: 3 dB bandwidth, 375 kHz; 40 dB bandwidth, 800 kHz
- Input Connectors: BNC
- Image Rejection: 60 dB
- Carrier Level Meter: Front panel meter to indicate relative signal level.

**MODULATION MEASUREMENTS**
- Meter Range: 0 to 133%, switchable positive or negative peaks, dB scale also provided.
- Meter Characteristics: 4½” (11.43 cm) illuminated scale, Scale and ballistics conform to FCC requirements.
- Frequency Response: ±0.1 dB from 50 Hz to 75 kHz
- Accuracy: ±4% over entire scale

**PEAK MODULATION INDICATORS**
- Variable Peak Indicators: Positive and negative peak modulation LED flashers. Peak limit set by thumbwheel switches in % increments from 50% to 129%
- Accuracy: ±4%
- Response Time: 1 cycle at 50 kHz

**MODULATION CALIBRATION**
- Deviation: 100% modulation equals ±75 kHz deviation. (Other calibrations available on special order)
- Calibrator: Built-in signal source produces precise, ±75 kHz signal for calibration of meter and peak flashers.

**OUTPUTS**
- 700 kHz IF: Output to drive Model 724 Stereo Monitor
- Audio (with de-emphasis): 1V RMS, 600 ohms unbalanced at 100% modulation, ±0.5 dB, 50 Hz to 15 kHz, noise 72 dB below 100% modulation at 400 Hz and 500 µV RF signal, Distortion: 0.1%
- Composite (without de-emphasis): 1V RMS, 600 ohms unbalanced at 100% modulation, ±0.1 dB, 50 Hz to 75 kHz.
- AM Detector: Residual AM measurements up to 20%, with de-emphasis, 70 dB signal-to-noise below 100%, level depends on input level.
- Carrier-off Alarm: Relay contact closure provided when loss of carrier.
- Remote Meter and Peak Flashers: For Model 704B Remote Meter and Flasher Panel.
- Output Connectors: BNC

**INPUT POWER**
- 115/230 ±10% VAC, 50 to 400 Hz, 30W (max)

**FCC TYPE APPROVAL NUMBER**
- Model 723: 3-202
- Model 734: 3-214

**Model 723 FM Frequency and Modulation Monitor**

These specifications apply to the Model 723 only:

**CARRIER FREQUENCY ERROR MEASUREMENT**
- Digital Readout: 0 to ±100 kHz in 1-Hz increments from assigned carrier frequency
- Accuracy: ±100 Hz per year
- Internal Frequency
- Standard: Precision, 5-MHz crystal oscillator in a proportionally controlled oven.
- Frequency Standard
- Outputs: 1 kHz, TTL level (rear panel); 1 MHz (front panel)

**SIX-DIGIT FREQUENCY COUNTER**
- Frequency Range: 10 Hz to 10 MHz
- Inputs: General purpose counter; Stereo pilot carrier from Model 724; SCA Subcarrier from Model 730.
- Input Sensitivity: 200 mV to 2V RMS
- Input Impedance: 500 ohms shunted by 25 pF
- Resolution: 1 Hz or 10 Hz, front-panel switchable
- Display Accuracy: ±1 count, plus time base accuracy
- Time-Base Aging Rate: 1 x 10⁻⁸/day after 30 days of operation

**Model 724 Stereo Monitor**

**INPUTS**
- Composite: 500 mV RMS, 600 ohms unbalanced
- I.F.: 700 kHz modulated, 100 mV RMS, 50 ohms from baseband monitor
- Input Connector: BNC

**MODULATION MEASUREMENTS**
- Meter Range: 0 to 133%, 0 to 40%, and dB scale
- Meter Characteristics: 4½” (11.43 cm) illuminated scale, scale and ballistics conform to FCC requirements.
- Attenuator Range: 50 dB in 10 dB steps, pushbutton selectable
- Frequency Response
  - Left, Right and (L+R) Channels: ±4% (±0.35 dB), 50 Hz to 15 kHz
  - (L-R) Channel: ±4% (±0.35 dB), 23 kHz to 63 kHz
- Accuracy: ±4% over entire range

**MODULATION CALIBRATION**
- Deviation: 100% modulation equals ±75 kHz deviation.
- Calibrator: Calibration signal from baseband monitor is used for calibration of meter.

**INTERNAL SEPARATION AND CROSSTALK**
- Separation: L-to-R and R-to-L: 45 dB min., 55 dB typical, 50 Hz to 15 kHz
- Crosstalk
  - (L+R) to (L-R) or (L-R) to (L+R): 60 dB min.
  - SCA to (L+R) or SCA to (L-R): 66 dB min, 10% SCA modulation
PILOT CARRIER MEASUREMENT

Level Accuracy ........ ±0.5% from 6% to 12% injection
Frequency Measurement Measured by the frequency counter in the Model 723 to an accuracy and resolution of ±0.1 Hz or can be measured by an external frequency counter.

OUTPUTS

Audio, (with de-emphasis) ........ 1V RMS, 600 ohms unbalanced at 100% modulation, ±0.35 dB, 50 Hz to 15 kHz. Distortion; less than 0.5%. Signal-to-noise: 60 dB below 100% modulation.
Audio (without de-emphasis) ........ 1V RMS, 600 ohms unbalanced at 100% modulation, ±0.35 dB, 50 Hz to 15 kHz.
Pilot Carrier (19 kHz) ........ 200 mV RMS, 50 ohms
Composite ..................... 1V RMS, 10K ohms at 100% modulation
Remote Meter .................. For Model 704C Remote Meter Panel.
Connectors .................. BNC

INPUT POWER

±15 and ±10 volts supplied by the baseband monitor

FCC TYPE APPROVAL NUMBER

Model 724 .................. 3-217

Model 730 SCA Monitor

INPUTS

Composite ..................... 1V, 600 ohms unbalanced.
Wideband ..................... 1V, 600 ohms unbalanced.
Connectors .................. BNC

MODULATION MEASUREMENTS

Meter Range .................. 0 to 133%, 0 to 40%, and dB scale
Meter Characteristics ........ 4½" (11.43 cm) illuminated scale. Scale and ballistics conform to FCC requirements.
Attenuator Range ............ 50 dB in 10 dB steps, pushbutton selectable.
Main Channel Modulation Measurement
100% Modulation ............ ±75 kHz
Modulation Accuracy (50 Hz to 15 kHz) .................. ±4%
Out-of-Band Rejection (20 kHz to 75 kHz) ............ 56 dB
SCA Injection Measurement Accuracy (1% to 30% injection) ........ ±0.5%
SCA Subchannel Modulation Measurement
100% Modulation ............ ±4 kHz or ±6 kHz, pushbutton selectable
Modulation Accuracy (100% Modulation, 1 kHz tone) ........ ±2%
Frequency Response, Composite input ........ ±1 dB, 20 Hz to 6 kHz
±2 dB, 20 Hz to 7.5 kHz

Spectral Response,
Wideband input ............ ±0.5 dB, 20 Hz to 7.5 kHz
Selectivity, Composite input ........ Narrow: 3 dB bandwidth, 3 kHz
........................................ Wide: 3 dB bandwidth, 20 kHz
........................................ 60 dB bandwidth, 20 kHz
........................................ 60 dB bandwidth, 21 kHz

INTERNAL CROSSTALK

Main to SCA .................. 66 dB
Stereo to SCA ................. 66 dB
SCA to main .................. 66 dB

SCA PEAK MODULATION INDICATORS

Variable Peak Indicators .... Positive and negative peak modulation LED flashers. Peak limit set by thumbwheel switches in 1% increments from 50% to 129%.
Accuracy .................. ±10%
Response Time ............... 1 cycle at 2 kHz

SCA MODULATION AND INJECTION LEVEL CALIBRATOR

Built-in modulation and injection level calibrator for calibrating the modulation meter and the peak flashers from the front panel.

SUBCARRIER FREQUENCY MEASUREMENT

Sub-Carrier #1 ............... 67 kHz (standard)
Sub-Carrier #2 ............... 41 kHz (optional)
Frequency Measurement ........ Measured by the frequency counter in the Model 723 or by an external frequency counter.

OUTPUTS

SCA Subcarrier ............... 500 mV, into 5K ohms
SCA Subcarrier alarm ........ Contact closure when subcarrier is below muting level.
Audio (with de-emphasis) .... 2V RMS, 600 ohms unbalanced at 100% modulation. De-emphasis internally strappable to 75 or 150 µsec.
Distortion .................. Wideband input: 0.5% at ±6 kHz
................................ Composite input: 1% at ±4 kHz,
................................ 1.5% at ±6 kHz
Signal-to-Noise .............. Composite or wideband input, 66 dB through baseband monitor, 55 dB at 10 MV RF
Audio (without de-emphasis) ........ 2V RMS, 600 ohms unbalanced at 100% modulation.
Remote Meter and Flashers . For Model 704B Remote Meter and Flasher Panel.
Connectors .................. BNC

INPUT POWER

115/230 ±10% VAC, 50 to 400 Hz, 25 watts max.

FCC TYPE APPROVAL NUMBER

Model 730 .................. 3-225

ALL UNITS

PHYSICAL AND ENVIRONMENTAL

Operating Temperature ........ 0° to 50°C (32° to 122°F)
Size .................. 7" (17.78 cm) high x 19" (48.26 cm)
wide x 17" (41.18 cm) deep
Weight .................. approx. 15 pounds (6.8 kg)

Specifications subject to change without notice.
About TFT

Since its start in 1971, TFT has become a major supplier of frequency and modulation monitors, setting new standards of convenience and accuracy. The reason for this rapid growth and wide acceptance by the broadcast industry is due primarily to the company’s leadership in technical development and quality design. TFT builds beyond the minimum FCC requirements to provide a complete line of monitoring equipment—FM, AM, and VHF/UHF TV—that always leads the state-of-the-art in performance and reliability. Among other things, TFT has pioneered such broadcast monitoring advances as frequency synthesizers, direct calibration to NBS, remote monitoring without RF amplifiers, phase-lock-loop technology and digital frequency display.

All TFT instruments carry a one year warranty on workmanship and materials, and service is available nationwide.

For more information, or a demonstration, of the TFT Monitor that is best for your application, contact your local sales representative. Or, contact TFT at the address listed below.
FM/Stereo/SCA Modulation Monitors

Maximum modulation for maximum coverage
To maximize your FM station's market coverage, you need more than a powerful transmitter. You also need all the modulation you're legally entitled to. Then you can reach all of your potential listeners, including those in fringe areas you might now be losing. TFT designed the Model 844 FM/Baseband/Stereo and Model 845 SCA Modulation Monitors for just that reason. They give you the ability to modulate your transmitter to the maximum legal limit—with absolute confidence.

Based on TFT's 14 years of engineering experience—with over 5,000 modulation monitors operating worldwide—these third generation instruments bring you innovations that solve today's modulation problems, using today's advanced technology. You get everything you need for complete proof-of-performance measurements (for distortion, an external analyzer is needed) right on the front panels, plus accuracy, versatility and convenience no other monitors can match.

The Model 844 combines a tuneable RF preselector, a baseband monitor and a stereo monitor in one compact instrument. The Model 845 SCA monitor is a multi-frequency instrument designed for use with the Model 844. With an optional receiver module, the 845 can be used as a stand-alone unit, for both off-air and direct transmitter monitoring.

Both the Model 844 and the Model 845 can be used for remote, off-air monitoring or for direct transmitter measurements. Both are also adaptable to Automatic Transmission System (ATS) use. Additionally, the Model 844 features 50 kHz, frequency synthesized channel tuning, to accommodate all U.S. and international standards.

State-of-the-art design, for optimum monitor performance, includes the use of linear phase filters, large scale integrated circuits (LSI) and toroidal power transformers to reduce hum and power line noise. Modular PC cards make service and routine calibrations easy, and high quality, industrial grade electronic components and parts are used throughout.

The Most Accurate Peak Detection Available

A technique originated by TFT—the use of digitally-settable peak flashers to display plus and minus modulation peaks simultaneously—has now been made even more accurate and useful. The Model 844 and Model 845 both have a unique (patent pending) Peak Modulation Duration Differentiator (P.M.D.D.) This device is incorporated into the peak modulation detecting circuit to separate true modulation peaks from those caused by transient noise, overshoot and multipath distortion.

The TFT P.M.D.D. allows you to digitally set a "window" (see Figure 2) to the peak width you determine at your transmitter output. Once the window is set, only peaks of that width, or wider, will trigger the peak flashers. As a result, the peak flashers respond only to over-modulation that is truly caused by your transmitter.

Features

Model 844 & 845

In addition to the peak flashers and peak differentiator, the 844 and 845 share several other advanced features:
Specifications

Model 845

INPUT
Signal level .................. 1 V, 600 ohms unbalanced
Connector .................. BNC
Frequency range ............ 25 kHz to 125 kHz
Type of input ................. Composite of subcarrier selectable from front panel switch

MODULATION MEASUREMENTS
Meter range .................. 0 to 133%, 0 to 40%, and dB scale
Meter characteristics .......... 3½” illuminated scale
Meter attenuator range ........ 50 dB in 10 dB steps, push-button selectable

Main Channel Measurement:
100% modulation ............. ± 75 kHz
Modulation accuracy (50 Hz to 15 kHz) .......... ± 4%
Out-of-band rejection (20 kHz to 75 kHz) ........ 56 dB
SCA Injection Accuracy .......... ± 0.5%, 5% to 30% injection level

SCA Subchannel Measurement:
100% modulation ............. ± 4 kHz or ± 6 kHz, push-button selectable
Modulation accuracy (100% modulation, 1 kHz tone) .......... ± 2%

Frequency Response:
Composite input ............ ± 1 dB, 40 Hz to 6 kHz or ± 2 dB, 20 Hz to 7.5 kHz
* Subcarrier input ............ ± 0.5 dB, 20 Hz to 7.5 kHz

INTERNAL CROSSTALK
* Main to SCA ................. 66 dB
* Stereo to SCA ................. 66 dB
* SCA to main ................ 66 dB
* Wideband input measurement

SCA PEAK MODULATION INDICATORS
Variable peak indicators ........ Positive and negative modulation LED flashers, peak limit set by thumbwheel switches in 1% increments from 50% to 199%
Accuracy .................. ± 1%
Response time ............. Variable pulse width discrimination, adjustable from the front panel thumbwheel switch

SCA MODULATION AND INJECTION LEVEL CALIBRATOR
Built-in modulation and injection level calibrator for calibrating modulation meter and the peak flashers from the front panel. Accuracy ±1%.

SUBCARRIER FREQUENCY MEASUREMENT
SCA carriers .................. Available on front panel for external frequency counter

OUTPUTS, FRONT AND REAR PANEL
SCA subcarrier .......... 500 mV, into 5K ohms
SCA subcarrier alarm ........ Contact closure when subcarrier is below muting level
Audio (with de-emphasis) .... 2 V RMS, 600 ohms unbalanced at 100% modulation, de-emphasis internally selectable to 75 or 150 sec
* Distortion .................. Subcarrier only input 0.5% at ± 6 kHz
* Signal-to-noise ............. 66 dB with de-emphasis
Audio (without de-emphasis) ... 2 V RMS, 600 ohms unbalanced at 100% modulation
Remote meter and flashers .... For Model 805 remote meter and flasher panel
Connectors .................. BNC

MECHANICAL AND ENVIRONMENTAL
Input power ................. 115/230 ± 10% VAC, 50 to 400 Hz, 40 watts max
Operating temperature .......... 0°C to 50°C (32°F to 122°F)
Size .................. 3½” (8.89 cm) high x 19” (48.26 cm) wide x 14.75” (37.47 cm) deep
Net weight .................. Approximately 9.5 pounds (4.3 kg)
Shipping weight .............. Approximately 12.5 pounds (5.6 kg)

For more information about, and a demonstration of, TFT monitors and/or other TFT products, call your local TFT sales representative. Or contact TFT in Santa Clara, California.

Committed to keeping you, on the air!
3090 Oakmead Village Dr., Santa Clara, CA 95051 • (408) 727-7272 • TWX 910-338-0584
Frequency Synthesized Modulation Calibrator: A frequency synthesized-type FM modulation calibrator is built-in for calibration of the modulation meters and peak flashers. The stability and accuracy of this type of calibrator are determined by the crystal oscillators. They do not change with temperature and aging. The use of the modulation calibrator requires only the push of a front panel button: no external equipment is needed. Accuracy is better than 1 percent, year after year.

Automatic IF Bandwidth Selection: The appropriate bandwidth is selected automatically when you change between remote and on-site monitoring. This eliminates bandwidth restriction, for proof-of-performance measurements, and makes the monitor easier to use.

Adjustable Peak Flashers: Flashers are adjustable from 50 percent to 99 percent. Digital thumbwheel switches eliminate the ambiguity of potentiometer-type controls.

Built-In Voltmeter and Attenuator: A 50 dB attenuator, with 10 dB steps, allows you to make low-level modulation and noise measurements on the modulation meter. The only other instruments you need, to perform a complete proof, is a distortion analyzer and an audio generator.

Multipath Detector: This built-in feature allows you to manipulate your monitor's antenna to minimize multipath distortion when you're monitoring off-air.

Digital Peak Counter: A special convenience for ATS operation, this built-in counter accumulates the actual modulation peaks and updates the display every one minute.

Frequency Counter Output: Front panel outputs are provided for frequency measurement of the main carrier and subcarriers using an external counter.

Compact Size: Panel height for the Model 844 is only 7 inches; for the Model 845, the panel height is 3 inches.

Model 844 FM/Stereo Monitor

Modulation Comparison Capability: The built-in preselector in the Model 844 allows you to digitally select any two FM stations, then precisely monitor, off-air, the modulation and carrier frequency error of either one. This gives you a quick, easy way to check on how your modulation measures up to that of other stations in your market.

Complete Stereo Measurements: The Model 844 makes complete measurements of right channel modulation, left channel modulation, channel separation, cross talk between main and sub-channels, L + R, L - R, 38 kHz carrier suppression and 19 kHz injection level. Measurements are selected by front-panel pushbuttons, and are read on the Modulation/Test Meter. A front panel BNC connector provides an output of the signal displayed on the Modulation/Test Meter.

PLL Demodulator: The Model 844 provides superior separation measurements by using a phase-locked loop (PLL) to regenerate the 38 kHz suppressed carrier from the 19 kHz pilot carrier. This ensures precise accuracy and long-term stability for the phase relationship between the two signals. It also eliminates the need for phase alignments of the two signals when accurate separation measurements are needed.

Simultaneous L and R Monitoring: Two separate meters on the Model 844 permit simultaneous monitoring of left and right channel modulation.

Total modulation is read on a third front panel meter.

Direct AM Measurements: An AM switch on the front panel of the Model 844 allows you to use the instrument for direct measurement of incidental and residual AM on your transmitted carrier. Measurements are read on the modulation meter.

Wide Band Frequency Response: Response is greater than 100 kHz to cover the 92 kHz subcarrier allowed by the FCC.

Excellent Stereo Separation: Separation of 55 dB, via the use of linear phase filters, is provided from 50 Hz to 15 kHz.

Switchable De-Emphasis: When the Model 844 is measuring AM or low-level noise and modulation, a 75 μsec de-emphasis circuit can be switched into the meter circuit (other time constants available on request). This is done by pushing the S/N switch on the Model 844 front panel.

Figure 3: Model 844 permits front panel waveform monitoring.

PLL Demodulator: The Model 844 uses a pulse-counting FM discriminator circuit to optimize frequency to voltage conversion. Consequently, total harmonic distortion is less than 0.1 percent.

Scope Outputs: Outputs are provided on the front panel of the Model 844 for external oscilloscope connection. Signals feeding the meter displays are accessible for external uses. The phase relationship of the L and R channels can be observed or adjusted through the use of these connectors.
Remote Metering: Outputs are available on the rear panel of the Model 844 for use with an optional, TFT Model 804 Remote Panel.

Model 844 Options
Remote Metering Panel, Model 804: Panel duplicates flasher and meter readings and comes with 50 feet of cable. TFT Part No. 5116-0804.

Absence of Modulation Alarm, Option 01: Plug in circuit board. Alarm triggered when composite signal drops below 30 percent modulation for a period of time between 2 seconds and 1 minute. Time is user adjustable.

Carrier-Fail Alarm, Option 01: Plug in circuit board. Alarm triggered when RF carrier drops below 50 percent of nominal.

Note: Both alarm options are furnished together as Option 01. TFT Part No. 7100-3870.

Model 845
FM SCA Monitor
Multiple SCA Frequencies: Up to three customer-specified frequencies are selectable from the front panel of the Model 845, to accommodate today's multi-channel operations.

Model 845 Options
Remote Metering Panel, Model 805: Panel duplicates the meters and peak flashers and comes with 50 feet of cable. TFT Part No. 5116-0805.

RF Module, Option 01: Allows use of the Model 845 as a stand-alone unit for off-air monitoring of SCA channels. TFT Part No. 7100-3880.

TFT: Quality and Innovation
Since 1971, TFT has been the major supplier of frequency and modulation monitors for AM, FM, FM/Stereo, lock-loop technology, phase linear filters and tuneable preselectors.

TFT also manufactures the 7600 Series Digital Remote Control System, the first modular all-digital system for remote control of AM, FM and TV transmitters.

STL is another area of TFT innovation. The TFT 8300 STL outperforms any other, even in the densest RF environment. Features include a 75 dB SNR, stereo separation of 50 dB or better, and IF modulation for low distortion and high stereo performance. The system carries a two-year warranty.

In addition, TFT provides complete service support for all of the company's products. Key management and technical personnel are always available by phone, 24 hours-per-day, 7 days-a-week to help customers with technical problems or spare parts requirements. Additional support is provided by a network of factory trained sales representatives.

Today, about 80 percent of the radio and TV stations in the U.S., plus a large and growing number of stations in Canada, Europe, Latin America and Africa, use a TFT instrument for monitoring, controlling or testing.

Figure 4: Model 845 SCA modulation monitor

Complete SCA Measurements: The Model 845 makes complete, accurate measurements of injection level, modulation, S/N ratio, crosstalk and T.H.D. (using an external analyzer). Measurement modes are selected by front panel pushbuttons. In addition, for true proof-of-performance measurements (at the transmitter), a SCA and VHF/UHF TV. TFT builds beyond FCC requirements to provide equipment that always leads the state-of-the-art in accuracy, convenience and reliability. TFT has pioneered such broadcast monitoring advances as frequency synthesized FM calibration, off-air monitoring with frequency synthesized RF amplifiers, phase-
## Specifications

### Model 844

#### RF SECTION

- **Frequency range**: 88–108 MHz, tunable in 50 kHz steps
- **On-site RF input voltage**: 1 to 10 volts rms
- **Antenna input voltage**: 250 µV to 100 mV
- **Tuning**: Two 4-digit switches and a push-button switch for selecting A or B station
- **AGC range**: 60 dB
- **Input impedance, antenna**: 75 ohms
- **Input connector, antenna**: Type F

#### MODULATION METERS, TOTAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deviation for 100% indication</td>
<td>±75 kHz peak to peak</td>
</tr>
<tr>
<td>Meter range</td>
<td>0 to 133% modulation</td>
</tr>
<tr>
<td>AC volt meter range</td>
<td>0 to −50 dB in 10 dB steps</td>
</tr>
<tr>
<td>Accuracy (5-kHz tone)</td>
<td>±2% at all modulation levels</td>
</tr>
<tr>
<td>Frequency response</td>
<td>±0.1 dB typical, ±0.25 dB max, from 50 Hz to 120 kHz</td>
</tr>
<tr>
<td>Characteristics</td>
<td>Quasi-peak reading circuit</td>
</tr>
<tr>
<td>Remote output</td>
<td>Suitable for driving external remote readout meter panels</td>
</tr>
</tbody>
</table>

#### MODULATION METER, RIGHT

- **Right channel modulation**: Indicates and measures right channel modulation

#### MODULATION METER, LEFT/TEST

- **Left channel modulation**: Indicates and measures left channel modulation
- **Main channel**: Same as right modulation meter
- **L + R**: ±0.35 dB, 50 Hz to 15 kHz
- **L − R**: ±0.35 dB, 23 kHz to 53 kHz
- **38 kHz level**: Measure down to −60 dB
- **Pilot level**: Measure down to −60 dB
- **Phase calibration**: For optimization of stereo measurements
- **AM noise**: Measures AM noise
- **Multipath indicator**: For adjustment of antenna to minimize multipath distortion

#### PEAK MODULATION INDICATORS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Deviation for 100% indication</td>
<td>±75 kHz</td>
</tr>
<tr>
<td>Peak level</td>
<td>Set by a front panel 3-digit thumbwheel switch in 1% steps from 50% to 199% on both positive and negative peaks</td>
</tr>
<tr>
<td>Accuracy (5-kHz tone)</td>
<td>±2% at 100% modulation</td>
</tr>
<tr>
<td>Frequency response</td>
<td>±2% from 30 Hz to 120 kHz</td>
</tr>
<tr>
<td>Response time accuracy</td>
<td>Adjustable, 10 cycles of 10 kHz or faster</td>
</tr>
<tr>
<td>Remote flasher output</td>
<td>Suitable for driving two remote meter panels</td>
</tr>
<tr>
<td>Peak counter</td>
<td>Registers number of peaks per minute</td>
</tr>
</tbody>
</table>

#### MEASUREMENT OF RESIDUAL AM

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>0 to 70 dB</td>
</tr>
<tr>
<td>Accuracy (−30 dB)</td>
<td>±1 dB</td>
</tr>
</tbody>
</table>

#### OUTPUTS, FRONT AND REAR PANEL

- **Main channel output with 75 sec de-emphasis**: 5 volts rms into 5K ohms at 400 Hz
- **Signal to noise ratio**: 78 dB at 400 Hz with de-emphasis
- **Harmonic distortion**: 0.1% max (de-emphasized)
- **Intermodulation distortion**: 0.1% max per SMPTE standard
- **Frequency response**: ±0.25 dB from 30 Hz to 120 kHz composite
- **Balanced audio output level**: 0 dBm into 600 ohms
- **Balanced audio frequency response**: ±0.5 dB from 30 Hz to 120 kHz
- **SCA output at rear panel**: 1 volt rms into 600 ohms
- **Audio (with de-emphasis)**
  - **left and right**: 1 V RMS, 600 ohms unbalance at 100% modulation (400 Hz)
- **Audio (without de-emphasis)**
  - **left and right**: 1 V RMS, 600 ohms unbalanced at 100% modulation
- **Pilot carrier (19 kHz)**
  - **Composite**: 600 mV RMS, available on front panel
- **Remote meter**
  - For Model 804 remote meter panel
- **Connectors**
  - BNC
- **Meter output**
  - Main meter selected signal available on front panel
- **Carrier-fall alarm, optional**
  - Relay drive output capable of sinking 50 mA to 30 V DC when RF carrier drops below 50% of nominal
- **Absence of modulation alarm, optional**
  - An output capable of sinking 50 mA at 30 V DC when composite signal drops below 30% modulation for a period of time between 2 seconds and 1 minute, internally adjustable

#### STEREO SEPARATION AND CROSSTALK

- **Separation L-to-R and R-to-L**: 60 dB typical, 55 dB minimum, 50 Hz to 15 kHz
- **Crosstalk (L + R) to (L − R)** or **(L − R) to (L + R)**: 65 dB min
- **Crosstalk SCA to (L + R)** or **SCA to (L − R)**: 70 dB min
- **Pilot carrier measurement level accuracy**: ±0.5% from 6% to 12% injection

#### MECHANICAL AND ENVIRONMENTAL

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Input power</td>
<td>115/230 ±10% VAC, 50 to 400 Hz, 40 watts max</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>0°C to 50°C (32°F to 122°F)</td>
</tr>
<tr>
<td>Size</td>
<td>7&quot; (17.8 cm) high × 19&quot; (48.26 cm) wide × 15&quot; (38.10 cm) deep</td>
</tr>
<tr>
<td>Net weight</td>
<td>Approximately 18.5 pounds (8.4 kg)</td>
</tr>
<tr>
<td>Shipping weight</td>
<td>Approximately 22.5 pounds (10.2 kg)</td>
</tr>
</tbody>
</table>

*High level RF input*
# PRICE SCHEDULE
## BROADCAST MONITORING EQUIPMENT

### TV PRODUCTS

<table>
<thead>
<tr>
<th>MODEL 701</th>
<th>TV FREQUENCY &amp; AURAL MODULATION MONITOR, Rack Mount</th>
<th>$7,985.00</th>
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<tbody>
<tr>
<td>Option 02 (7100-0050)</td>
<td>Alarm (frequency and modulation)</td>
<td><strong>$565.00</strong></td>
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<tr>
<td>Option 03 (7100-0010)</td>
<td>SCA Output</td>
<td><strong>$530.00</strong></td>
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<td>*Option 07 (7100-0030)</td>
<td>CCIR Format</td>
<td>$1,110.00</td>
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<tr>
<td>Option 08 (7100-0060)</td>
<td>Spare Parts Kit</td>
<td><strong>$785.00</strong></td>
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<table>
<thead>
<tr>
<th>MODEL 702</th>
<th>TV AURAL MODULATION MONITOR, Rack Mount</th>
<th>$4,790.00</th>
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</thead>
<tbody>
<tr>
<td>Option 02 (7100-0230)</td>
<td>Alarm (Modulation only)</td>
<td><strong>$270.00</strong></td>
</tr>
<tr>
<td>Option 03 (7100-0010)</td>
<td>SCA Output</td>
<td><strong>$535.00</strong></td>
</tr>
<tr>
<td>Option 05 (7100-0240)</td>
<td>Spare Parts Kit</td>
<td><strong>$525.00</strong></td>
</tr>
<tr>
<td>*Option 06 (7100-0070)</td>
<td>CCIR Format</td>
<td>$995.00</td>
</tr>
</tbody>
</table>

| MODEL 704 | Remote Meter and Peak Flasher Panel | **$510.00** |

### FM PRODUCTS

<table>
<thead>
<tr>
<th>MODEL 844</th>
<th>FM/Stereo Modulation Monitor (Specify Frequency)</th>
<th>$5,250.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 01 (7100-3870)</td>
<td>Absence of Modulation/Carrier Fail Alarm</td>
<td>$275.00</td>
</tr>
<tr>
<td>Option 02 (7100-3890)</td>
<td>Spare Parts Kit</td>
<td>$475.00</td>
</tr>
</tbody>
</table>

| MODEL 804 | Remote Metering and Peak Flasher Panel for Model 844 | $525.00 |

<table>
<thead>
<tr>
<th>MODEL 845</th>
<th>FM SCA Modulation Monitor</th>
<th>$2,200.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 01 (7100-3880)</td>
<td>RF Module-Preselector</td>
<td>TBA</td>
</tr>
<tr>
<td>Option 02 (7100-3900)</td>
<td>SCA Channel (41 kHz)</td>
<td>$225.00</td>
</tr>
<tr>
<td>Option 03 (7100-3910)</td>
<td>SCA Channel (92 kHz)</td>
<td>$225.00</td>
</tr>
<tr>
<td>Option 04 (7100-3920)</td>
<td>Spare Parts Kit</td>
<td>$220.00</td>
</tr>
</tbody>
</table>

| MODEL 805 | Remote Metering and Peak Flasher Panel for Model 845 | $475.00 |

<table>
<thead>
<tr>
<th>MODEL 763</th>
<th>FM Modulation Monitor (Specify Frequency)</th>
<th>$1,985.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 04 (7100-2430)</td>
<td>Absence-of-Modulation Alarm</td>
<td><strong>$275.00</strong></td>
</tr>
<tr>
<td>*Option 06 (7100-2460)</td>
<td>230 VAC</td>
<td>$50.00</td>
</tr>
<tr>
<td>Option 07 (7100-2880)</td>
<td>Spare Parts Kit</td>
<td><strong>$275.00</strong></td>
</tr>
</tbody>
</table>

| MODEL 704F | Remote Meter and Peak Flasher Panel for 763 | **$475.00** |

<table>
<thead>
<tr>
<th>*MODEL 764A</th>
<th>FM Preselector with Frequency Readout, Tunable</th>
<th>$1,495.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 03 (7100-2510)</td>
<td>Spare Parts Kit</td>
<td>$320.00</td>
</tr>
</tbody>
</table>

| *MODEL 785 | Single Channel FM Preselector | $600.00 |

<table>
<thead>
<tr>
<th>MODEL 724A</th>
<th>STEREO MONITOR</th>
<th>$2,125.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 01 (7100-1060)</td>
<td>Spare Parts Kit</td>
<td><strong>$250.00</strong></td>
</tr>
<tr>
<td>*Option 02 (7100-2460)</td>
<td>230 VAC</td>
<td>$50.00</td>
</tr>
</tbody>
</table>

| MODEL 704C | Remote Meter Panel for 724A | **$525.00** |

<table>
<thead>
<tr>
<th>MODEL 730A</th>
<th>SCA MONITOR, 67 kHz</th>
<th>$2,425.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 01 (7100-1510)</td>
<td>SCA Channel (41 kHz)</td>
<td><strong>$230.00</strong></td>
</tr>
<tr>
<td>Option 02 (7100-1520)</td>
<td>Spare Parts Kit</td>
<td><strong>$210.00</strong></td>
</tr>
<tr>
<td>*Option 03 (7100-1530)</td>
<td>For direct FSK Data Transmission</td>
<td>$230.00</td>
</tr>
<tr>
<td>*Option 04 (7100-2460)</td>
<td>230 VAC</td>
<td>$50.00</td>
</tr>
<tr>
<td>*Option 05 (7100-3730)</td>
<td>SCA Channel (92 kHz)</td>
<td>$285.00</td>
</tr>
</tbody>
</table>

| MODEL 704B | Remote Meter and Peak Flasher Panel for 730A | **$475.00** |

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*Not Field Installable
(Additional retrofit charge, contact factory or Representative) **For new equipment only. On older equipment, price is $375.00 including recalibration.**

** Add 15% to list price of options when ordered separately.
BROADCAST MONITORING EQUIPMENT

AM PRODUCTS

<table>
<thead>
<tr>
<th>MODEL 753</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 03 (7100-2410)</td>
<td>AM Modulation Monitor</td>
<td>$1,425.00</td>
</tr>
<tr>
<td>Option 04 (7100-2420)</td>
<td>10 kHz Whistle Filter</td>
<td>$<strong>325.00</strong></td>
</tr>
<tr>
<td>Option 05 (7100-2430)</td>
<td>30 Hz Telemetry Lowpass</td>
<td>$<strong>245.00</strong></td>
</tr>
<tr>
<td>*Option 06 (7100-2460)</td>
<td>Absence-of-Modulation Alarm</td>
<td>$<strong>275.00</strong></td>
</tr>
<tr>
<td>Option 07 (7100-2560)</td>
<td>230 VAC</td>
<td>$50.00</td>
</tr>
<tr>
<td>*MODEL 754</td>
<td>AM RF Preselector with Frequency Readout</td>
<td>$1,850.00</td>
</tr>
<tr>
<td>Option 01 (7100-2470)</td>
<td>Narrow Band Filter</td>
<td>$<strong>465.00</strong></td>
</tr>
<tr>
<td>Option 04 (7100-2500)</td>
<td>Spare Parts Kit</td>
<td>$<strong>275.00</strong></td>
</tr>
</tbody>
</table>

| MODEL 704E       | Remote Meter and Peak Flashers                   | $475.00 |

EBS PRODUCTS

| MODEL 760-1A   | AM Receiver/Encoder/Decoder                      | $1,195.00 |
| MODEL 760-1B  | Single Channel FM Receiver/Encoder/Decoder       | $1,195.00 |
| MODEL 760-1C  | Dual Channel FM Receiver/Encoder/Decoder         | $1,395.00 |

FM-SCA PRODUCTS

| MODEL 830        | FM-SCA Subcarrier Generator                      | $1,575.00 |

*Not Field Installable

(Additional retrofit charge, contact factory or Representative, **Add 15% to list price of options when ordered separately.

TERMS OF SALE

All shipments are made F.O.B. Santa Clara, California. Terms are net 30 days to customers who have a satisfactory established line of credit with us. Others should arrange with the factory for payment at the time of shipment.

WARRANTY

TFT, Inc. warrants each of the instruments or its manufacture to be produced to meet the specifications delivered to the BUYER, and to be free from defects in material and workmanship; and will repair or replace at its expense, for a period of one year from the date of delivery of equipment, any parts which are defective from faulty material or workmanship. Equipment, accessories, tubes and batteries not manufactured by TFT, Inc. are subject to only such warranties as those listed by the manufacturer.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charge prepaid by BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER prior to such returns. Upon examination by the factory, if the instrument is found to be defective, the unit will be repaired and returned to the BUYER, with transportation charge prepaid by SELLER.

Transportation charges for instruments found to be defective within the first thirty (30) days of the warranty period will be paid both ways by the SELLER. Transportation charges for warranty returns and repair costs, wherein failure is found not to be the fault of the SELLER, shall be paid both ways by the BUYER.

This warranty does not apply to instruments which, in the opinion of the SELLER, have been altered or misused. No other warranty is expressed or implied. SELLER SPECIFICALLY EXCLUDES AND DISCLAIMS ANY WARRANTY FOR FITNESS OF PURPOSE AND MERCHANTABILITY. IN NO EVENT SHALL SELLER BE RESPONSIBLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES. Price subject to change without notice.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

3090 OAKMEAD VILLAGE DR., SANTA CLARA, CA. 95051 • (408) 727-7272 TWX 910-338-0584
## PRICE SCHEDULE
### REMOTE CONTROL EQUIPMENT
November 26, 1984

<table>
<thead>
<tr>
<th>MODEL/DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL 7610</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5115-7610)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Channel RAISE/LOWER Plus 10 channel Telemetry digital remote control system. Expandable by adding Model 7630, 7632, 7620R to a 110-channel system</td>
<td>To provide digital remote control systems for medium and large size AM, FM &amp; TV stations. Also suitable for controlling multi-site operations</td>
<td>$3,250.00</td>
</tr>
<tr>
<td><strong>Option 01</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7100-2610)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-carrier (SCA) Detector; for FM use 67 kHz. Other frequencies from 26 kHz to 185 kHz available. Mounts within 7610 Control or Remote Terminal.</td>
<td>To provide demodulation of the SCA subcarrier</td>
<td><strong>$ 250.00</strong> <em>(specify frequency)</em></td>
</tr>
<tr>
<td><strong>Option 02</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7100-2620)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sub-carrier (SCA) Generator; for FM use 67 kHz. Other frequencies from 26 kHz to 185 kHz available. Mounts within 7610 Control or Remote Terminal.</td>
<td>To generate the SCA subcarrier</td>
<td><strong>$ 250.00</strong> <em>(specify frequency)</em></td>
</tr>
<tr>
<td><strong>Option 03</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7100-2600)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SCA generator/detector in one module.</td>
<td>Single module combines functions of options 01 and 02</td>
<td><strong>$ 500.00</strong></td>
</tr>
<tr>
<td><strong>Option 04</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7100-2650)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCD parallel data inputs (for the Remote Terminal)</td>
<td>To provide two channels of parallel BCD inputs to accept external digital data such as the readings from a digital frequency monitor or frequency counter</td>
<td><strong>$ 250.00</strong></td>
</tr>
<tr>
<td><strong>Option 05</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7100-2730)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parallel BCD Data Output Cable Kit (for 7610C Control Terminal)</td>
<td>A cable kit to provide external control of channel selection, RAISE/LOWER function and parallel BCD output of the channel identification and DVM reading</td>
<td><strong>$ 150.00</strong></td>
</tr>
<tr>
<td><strong>Option 06</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7100-2720)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Components for Remote Terminal Extender Cable</td>
<td>To provide mating connector and PC boards for customer constructed extension cable. Remote Terminal may be removed from the rack without having to disconnect wirings to and from the transmitter sensors. (Wire not included)</td>
<td><strong>$ 100.00</strong></td>
</tr>
<tr>
<td><strong>Option 07</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7100-2740)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.'s and other critical components for emergency repair</td>
<td><strong>$ 395.00</strong></td>
</tr>
<tr>
<td><strong>Option 08</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7100-2460)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>230 VAC</td>
<td></td>
<td>$ 50.00</td>
</tr>
<tr>
<td><strong>MODEL 7610-C</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5116-7610)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control portion only of 7610 system</td>
<td>To provide an alternate control location for 7610</td>
<td>$1,500.00</td>
</tr>
<tr>
<td><strong>MODEL 7610-R</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5116-7620)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote portion only of 7610 system</td>
<td>For use at each additional remote site up to 16</td>
<td>$2,000.00</td>
</tr>
<tr>
<td><strong>MODEL 7630-R</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(5116-7630)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Channel Expander (20 channels)</td>
<td>To expand the RAISE/LOWER and Telemetry channels of the Model 7610 from 10 each to 30 each (to be installed at the Remote Terminal only)</td>
<td>$1,450.00</td>
</tr>
<tr>
<td><strong>Option 01</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7100-2760)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.'s critical components for emergency repair</td>
<td><strong>$ 195.00</strong></td>
</tr>
<tr>
<td><strong>Option 02</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(7100-2720)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Components for Remote Terminal Extender Cable</td>
<td>To provide mating connector and PC boards for customer constructed extension cable. Remote Terminal may be removed from the rack without having to disconnect wirings to and from the transmitter and sensors. (Wire not included)</td>
<td><strong>$ 100.00</strong></td>
</tr>
</tbody>
</table>

* Not field installable (Additional Retrofit Charge, Contact Factory or Representative)

**Add 15% to List Price of Options When Ordered Separately**
<table>
<thead>
<tr>
<th>MODEL/DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL 7815</strong> (STAND ALONE UNIT)</td>
<td>(5115-7815) Status and Control System with 15 ON/OFF control and 15 status indication channels, consisting of a Control and Remote unit.</td>
<td>$3,500.00</td>
</tr>
<tr>
<td>Option 01 (7100-3050C) (7100-3060R)</td>
<td>Time Share Capability</td>
<td>**$ 545.00</td>
</tr>
<tr>
<td>Option 02 (7100-3100) Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.'s and other critical components for emergency repair.</td>
<td>**$ 380.00</td>
</tr>
<tr>
<td>Option 03 (7100-3130) Momentary Switch Kit</td>
<td>8 momentary switches and instructions for replacing front panel toggle switches. Field Installation Only</td>
<td>$ 75.00</td>
</tr>
<tr>
<td>*Option 04 (7100-2460) 230 VAC</td>
<td></td>
<td>$ 50.00</td>
</tr>
<tr>
<td><strong>7815-C</strong> (5115-7815) Control portion of 7815 system</td>
<td>To provide an alternate control location for 7815</td>
<td>$1,725.00</td>
</tr>
<tr>
<td><strong>MODEL 7815-R</strong> (5116-7816) Remote portion only of 7815 system</td>
<td>For use at each additional remote site (up to 16)</td>
<td>$1,950.00</td>
</tr>
<tr>
<td><strong>MODEL 7830</strong> (5115-7830) Direct ON/OFF Control and Status monitoring</td>
<td>When operated in conjunction with the Model 7610, it provides 15 channels of direct ON/OFF control plus 15 channels of status indicators. Also acts as expansion unit to 7815 providing 15 to 30 additional control and status channels.</td>
<td>$2,850.00</td>
</tr>
<tr>
<td>Option 01 (7100-3080) Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.'s and other critical components for emergency repair.</td>
<td>**$ 350.00</td>
</tr>
<tr>
<td>Option 02 (7100-3130) Momentary Switch Kit</td>
<td>The kit consists of 8 momentary switches and instructions for replacing front panel toggle switches. Field Installation Only</td>
<td>**$ 75.00</td>
</tr>
<tr>
<td>*Option 03 (7100-2460) 230 VAC</td>
<td></td>
<td>$ 50.00</td>
</tr>
<tr>
<td><strong>MODEL 7830-C</strong> (5116-7830) Control portion only of 7830 system</td>
<td>For use at an alternate control location</td>
<td>$1,350.00</td>
</tr>
<tr>
<td><strong>MODEL 7830-R</strong> (5116-7831) Remote portion only of 7830 system</td>
<td>For use at each additional remote site</td>
<td>$1,600.00</td>
</tr>
<tr>
<td><strong>MODEL 7832</strong> (5115-7832) 32 Channel Status/Alarm</td>
<td>Can be used with Models 7610 or 7815 to provide an additional 32 to 64 channels of Status/Alarm.</td>
<td>$2,500.00</td>
</tr>
<tr>
<td>Option 01 (7100-3190) Spare Parts Kit</td>
<td>To provide spare parts such as relay's, I.C.'s and other critical components for emergency repair.</td>
<td>**$ 315.00</td>
</tr>
<tr>
<td>*Option 02 (7100-2460) 230 VAC</td>
<td></td>
<td>$ 50.00</td>
</tr>
<tr>
<td><strong>MODEL 7832-C</strong> (5116-7832) Control portion only of 7832 system</td>
<td>For use at an alternate control location</td>
<td>$1,275.00</td>
</tr>
<tr>
<td><strong>MODEL 7832-R</strong> (5116-7833) Remote portion only of 7832 system</td>
<td>For use at each additional remote site</td>
<td>$1,350.00</td>
</tr>
</tbody>
</table>

* Not Field Installable (Additional Retrofit Charge. Contact Factory or Representative)

**Add 15% to List Price of Options When Ordered Separately**
# MODEL 7900

<table>
<thead>
<tr>
<th>MODEL/DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MODEL 7900</strong></td>
<td>Master Control Terminal</td>
<td>$7,250.00</td>
</tr>
<tr>
<td>(5116-7900)</td>
<td>Master Control Unit</td>
<td></td>
</tr>
<tr>
<td><strong>MODEL 7910</strong></td>
<td>Allows operator to bypass keyboard for instant access to critical UP/DOWN controls.</td>
<td>$2,500.00</td>
</tr>
<tr>
<td>(5116-7910)</td>
<td>Direct Analog Control Unit</td>
<td></td>
</tr>
<tr>
<td><strong>MODEL 7920</strong></td>
<td>Provides 16 status and 16 ON/OFF controls and alarm</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>(5116-7920)</td>
<td>Direct Control/Status Unit</td>
<td></td>
</tr>
<tr>
<td><strong>MODEL 7930</strong></td>
<td>Provides 32 status and alarm</td>
<td>$1,625.00</td>
</tr>
<tr>
<td>(5116-7930)</td>
<td>Status Unit</td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 41</strong></td>
<td>CRT - Beehive with P42 green phosphor RS232 current interface</td>
<td>$2,200.00</td>
</tr>
<tr>
<td>(7100-3690)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 42</strong></td>
<td>IBM Personal Computer with asynchronous communications interface, 128K memory, dual disk drive and monochrome monitor.</td>
<td>$6,250.00</td>
</tr>
<tr>
<td>(7100-3691)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 43</strong></td>
<td>Autologger, TTY43</td>
<td>$2,200.00</td>
</tr>
<tr>
<td>(7100-3692)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 44</strong></td>
<td>Auto-Dial, Auto-Answer</td>
<td>$1,500.00</td>
</tr>
<tr>
<td>(7100-3693)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 45</strong></td>
<td>Acoustically Coupled Modem</td>
<td>$815.00</td>
</tr>
<tr>
<td>(7100-3694)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## REMOTE TRANSMITTER CONTROL TERMINALS

<table>
<thead>
<tr>
<th>MODEL 7901</th>
<th>Remote terminal has full display of site, channel, full 4-digit data with alpha-numeric units of measure, time, date, and Self Test LEDs. Also includes 16-key double function keyboard.</th>
<th>$7,250.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>(5116-7901)</td>
<td>Remote Control Terminal</td>
<td></td>
</tr>
<tr>
<td><strong>MODEL 7911</strong></td>
<td>Provides 16 channels of UP/DOWN control with analog monitoring</td>
<td>$2,500.00</td>
</tr>
<tr>
<td>(5116-7911)</td>
<td>Analog Telemetry &amp; Control Unit</td>
<td></td>
</tr>
<tr>
<td><strong>MODEL 7921</strong></td>
<td>Monitor 16 Status inputs and provides 160 ON/OFF controls in remote site</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>(5116-7921)</td>
<td>Remote Control and Status Unit</td>
<td></td>
</tr>
<tr>
<td><strong>MODEL 7931</strong></td>
<td>Monitor 32 status inputs in remote site</td>
<td>$1,625.00</td>
</tr>
<tr>
<td>(5116-7931)</td>
<td>Remote Status Unit</td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 46</strong></td>
<td>CRT - Beehive with P42 green phosphor screen, RS232 current interface</td>
<td>$2,200.00</td>
</tr>
<tr>
<td>(7100-3690)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 47</strong></td>
<td>Autologger, TTY43</td>
<td>$2,200.00</td>
</tr>
<tr>
<td>(7100-3692)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 48</strong></td>
<td>Auto-Dial, Auto-Answer</td>
<td>$1,500.00</td>
</tr>
<tr>
<td>(7100-3693)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## MODEL 7971

<table>
<thead>
<tr>
<th>MODEL 7971</th>
<th>Provides facilities to hold 16 ea. OPT-01 or -02 or 8 ea. OPT -03 or -04. Mounts on 19&quot; equipment rack</th>
<th>$120.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>(5116-7971)</td>
<td>Transmitter Interface</td>
<td></td>
</tr>
</tbody>
</table>

# MODEL 7973

<table>
<thead>
<tr>
<th>MODEL 7973</th>
<th>Provides power supply (110 VAC to 12 VDC) to power relays when other source is not available. Also provides mounting facilities for holding 6 ea. OPT-01 or -02 or 3 ea. -03 or -04.</th>
<th>$250.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>(5116-7973)</td>
<td>Transmitter Interface Panel and Power Supply</td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 01</strong></td>
<td>12 VDC to TTL</td>
<td>$40.00</td>
</tr>
<tr>
<td>(7100-3390)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 02</strong></td>
<td>120 VAC to TTL</td>
<td>$45.00</td>
</tr>
<tr>
<td>(7100-3400)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 03</strong></td>
<td>Momentary Relay</td>
<td>$50.00</td>
</tr>
<tr>
<td>(7100-3410)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>OPTION 04</strong></td>
<td>Magnetic Latching Relay</td>
<td>$60.00</td>
</tr>
<tr>
<td>(7100-3480)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Software options are required
## 7900 SYSTEM SOFTWARE OPTION PRICES

<table>
<thead>
<tr>
<th>SOFTWARE OPTIONS</th>
<th>SOFTWARE FEATURES</th>
<th>PRICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>7900</td>
<td>Provides two I/O ports to support external CRT with full remote control capability and a teletype for auto logging.</td>
<td>Included</td>
</tr>
<tr>
<td>7901</td>
<td>No interface to peripheral hardwares.</td>
<td>Included</td>
</tr>
<tr>
<td>7900 OPT. 57 (7100-3592)</td>
<td>An extra S I/O module is included in this option to provide two additional I/O ports to interface with IBM PC and an Auto-Dial/Auto-Answer Modem.</td>
<td>$7,000.00</td>
</tr>
<tr>
<td>7900 OPT. 59 (7100-3596)</td>
<td>An extra S I/O module is included in this option to provide two additional I/O ports to interface with IBM PC and an RS-232 interface at 300 BAUD for a second CRT display.</td>
<td>$7,000.00</td>
</tr>
<tr>
<td>7901 OPT. 61 (7100-3610)</td>
<td>Provides two I/O ports to support an external CRT (display only) and a teletype for auto-logging or an Auto-Dial/Auto-Answer Modem.</td>
<td>$3,000.00</td>
</tr>
<tr>
<td>7901 OPT. 62 (7100-3620)</td>
<td>An extra S I/O module is included in this option to provide a total of 3 ports to support an external CRT (display only), a teletype for auto-logging and an Auto-Dial/Auto-Answer Modem.</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>IBM OPT. 70 (7100-3700)</td>
<td>Provides software for IBM Personal Computer on 5 1/4&quot; disk to interface with TFT 7900 System to provide full control and data acquisition from IBM keyboard.</td>
<td>$4,000.00</td>
</tr>
<tr>
<td>IBM OPT. 71 (7100-3701)</td>
<td>Provides software for IBM Personal Computer on 5 1/4&quot; disk to allow operator to acquire store and down-load as needed for all operating parameters for the 7900 Remote Control System.</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>IBM OPT. 72 (7100-3702)</td>
<td>Provides a library of software sub-routines on 5 1/4&quot; disk for IBM Personal Computer to aid 7900 System users to write custom system control software.</td>
<td>$4,000.00</td>
</tr>
</tbody>
</table>
## REMOTE CONTROL INTERFACING ACCESSORIES

<table>
<thead>
<tr>
<th>MODEL/DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSU-01 (5116-GFSU)</td>
<td>To provide full compliance with FCC Rules by monitoring 4 critical parameters: aural power and visual power</td>
<td>$1,155.00</td>
</tr>
<tr>
<td>ADS-01 (5116-GADS) Alternate Data Path Selector</td>
<td>Switch from SCA to phone line when invalid data is detected from either the Control or the Remote terminal. Both local and remote units are included.</td>
<td>$1,565.00</td>
</tr>
<tr>
<td>CSA-01 (5116-OSCA) Chopper Amplifier</td>
<td>To provide isolation from a floating circuit to a grounded circuit. DC gain is also provided.</td>
<td><strong>$485.00</strong></td>
</tr>
<tr>
<td>PLC-01 (5116-PPLC) Power-to-linear Converter</td>
<td>To linearize power readings from log scale to linear scale</td>
<td><strong>$620.00</strong></td>
</tr>
<tr>
<td>TLK-01 (5116-OTLK) Tower Light Monitor</td>
<td>To monitor AC line current</td>
<td><strong>$270.00</strong></td>
</tr>
<tr>
<td>LVK-01 (5116-OLVK) Line Voltage Monitor</td>
<td>To monitor AC line Voltage</td>
<td><strong>$210.00</strong></td>
</tr>
<tr>
<td>PVK-01 (5116-OPVK) Plate Voltage Monitor</td>
<td>To monitor plate voltage up to 20 kv</td>
<td><strong>$210.00</strong></td>
</tr>
<tr>
<td>TSK-01 (5116-OTS) Temperature Sensing Kit</td>
<td>To monitor temperature of air or components</td>
<td><strong>$315.00</strong></td>
</tr>
<tr>
<td>MBB-01 (5116-OMBB) Isolation amplifier (high voltage)</td>
<td>For monitoring voltage and current at 10 kv above ground and translate reading in reference to ground voltage to suit the input of the Remote Terminals.</td>
<td><strong>$315.00</strong></td>
</tr>
</tbody>
</table>

**S1A1** (5115-S1A1) **S1A2** (5115-S1A2) **S1A3** (5115-S1A3)

<table>
<thead>
<tr>
<th>S1A1</th>
<th>S1A2</th>
<th>S1A3</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCA Generator</td>
<td>Unit converts FSK from modem to SCA frequency</td>
<td>$725.00</td>
</tr>
<tr>
<td>SCA Detector</td>
<td>Unit converts SCA frequency to FSK</td>
<td>$725.00</td>
</tr>
<tr>
<td>SCA Generator/Detector</td>
<td>Unit combines functions of S1A1 and S1A2</td>
<td>$950.00</td>
</tr>
</tbody>
</table>

### TERMS OF SALE

All shipments are made P.O.B. Santa Clara, California. Terms are net 30 days to customers who have a satisfactory established line of credit with us. Others should arrange with the factory for payment at the time of shipment.

**WARRANTY**

Time and Frequency Technology, Inc. warrants each of the instruments of its manufacture to be produced to meet the specifications delivered to the BUYER; and to be free from defects in material and workmanship; and will repair or replace at its expense, for a period of one year from the date of delivery of equipment, any parts which are defective from faulty material or workmanship. Equipment, accessories, tubes and batteries not manufactured by TFT are subject to only such warranties as those listed by the manufacturer.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charge prepaid by BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any remedy available by applicable law. All returns to the factory must be authorized by the SELLER, prior to such returns. Upon examination by the factory, if the instrument is found to be defective, the unit will be repaired and returned to the BUYER, with transportation charge prepaid by SELLER.

Transportation charges for instruments found to be defective within the first thirty (30) days of the warranty period will be paid both ways by the SELLER. Transportation charges for warranty returns and repair costs, wherein failure is found not to be the fault of the SELLER, shall be paid both ways by the BUYER. This warranty does not apply to instruments which, in the opinion of the SELLER, have been altered or misused. No other warranty is expressed or implied. SELLER SPECIFICALLY EXCLUDES AND DISCLAIMS ANY WARRANTY FOR FITNESS OF PURPOSE AND MERCHANTABILITY. IN NO EVENT SHALL SELLER BE RESPONSIBLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES.

Price subject to change without notice.

**Add 15% to List Price of Options When Ordered Separately**

RC 12/84 2.0M
PRICE SCHEDULE
STL/TSL ANTENNAS, COAXIAL TRANSMISSION LINE AND CONNECTOR KITS

<table>
<thead>
<tr>
<th>MODEL</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>P972GRN-M1</td>
<td>3500-0016</td>
<td>ANIXTER-MARK Grid Parabolic Antenna, six-foot diameter, for 890-960 MHz, type N female connector, 50 ohm (1.3:1 VSWR standard/1:5:1 special order), non-pressurized feed, vertical or horizontal polarization for mounting to 1.9 to 3.5 inch diameter O.D. pipe. (Other mounts on special order.) Gain 22.0 dB-midband.</td>
<td>$1,060.00</td>
</tr>
<tr>
<td>PR-450 U</td>
<td>3500-0001</td>
<td>SCALA Parallefactor, Parabolic Antenna, for 350-1000 MHz, type N female connector, 50 ohm, universal mounting for vertical or horizontal polarization. Gain 20.1 dB at 950 MHz.</td>
<td>$500.00</td>
</tr>
<tr>
<td>SH872GN</td>
<td>3500-0017</td>
<td>ANIXTER-MARK Multi-element Grid Parabolic Section Antenna (72&quot; x 36&quot;), for 675-960 MHz, type N female connector, 50 ohm, vertical or horizontal polarization, for mounting up to 3.5 inch round member. Gain 19.5 dB at 950 MHz.</td>
<td>$485.00</td>
</tr>
<tr>
<td>MF 960</td>
<td>3500-0002</td>
<td>SCALA Miniflector Antenna for 940-960 MHz, 16.1 dB gain, type N female connector, universal mounting for vertical or horizontal polarization, fully anodized. (Not recommended for congested areas.)</td>
<td>$300.00</td>
</tr>
<tr>
<td>MG 944GN</td>
<td>3500-0018</td>
<td>ANIXTER-MARK Mini Grid Parabolic Section Antenna (44&quot; x 13.5&quot;), for 890-960 MHz, type N female connector, 50 ohm, vertical or horizontal polarization, for mounting up to 3.5 inch round member. Gain 13.5 dB at 950 MHz.</td>
<td>$245.00</td>
</tr>
<tr>
<td>COX-01</td>
<td>3500-0003</td>
<td>ANDREW Heliax* LDF-50 Transmission Line 1/2&quot; foam Dielectric, 50 ohm, jacketed.</td>
<td>$1.70 per ft.</td>
</tr>
<tr>
<td>CON-01</td>
<td>3500-0004</td>
<td>Connector Kit for LDF4-50 Andrew Heliax* consisting of two (2) Andrew type L44N female connectors. Two (2) PTL-1 or equivalent needed for normal installation.</td>
<td>$42.00</td>
</tr>
<tr>
<td>COX-03</td>
<td>3500-0012</td>
<td>CABLEWAVE FLC-12-505 1/2&quot; Low Loss Foam Wellfex Coaxial Cable, foam Dielectric, 50 ohm, jacketed.</td>
<td>$1.50 per ft.</td>
</tr>
<tr>
<td>CON-03</td>
<td>3500-0013</td>
<td>Connector Kit for FLC-12-505 Cablewave, consists of two (2) Cablewave Part No. 738801, type N female connectors. Two (2) PTL-1 or equivalent needed for normal installation. One kit required for each length of FLC-12-505.</td>
<td>$40.00</td>
</tr>
<tr>
<td>CON-02</td>
<td>3500-0006</td>
<td>Connector Kit for LDF-50 Andrew Heliax* consisting of two (2) Andrew type female connectors. Two (2) PTL-1 or equivalent needed for normal installation. One kit required for each length of LDF5-50.</td>
<td>$4.30 per ft.</td>
</tr>
<tr>
<td>COX-04</td>
<td>3500-0014</td>
<td>CABLEWAVE FLC-78-505 7/8&quot; Low Loss Wellfex Coaxial Cable, foam Dielectric, 50 ohm, jacketed.</td>
<td>$9.90</td>
</tr>
<tr>
<td>CON-04</td>
<td>3500-0015</td>
<td>Connector Kit for Cablewave FLC-78-505, consists of two (2) Cablewave Part No. 738829, type N female connectors. Two (2) PTL-1 or equivalent needed for normal installation. One kit required for each length of FLC-78-505.</td>
<td>$4.70 per ft.</td>
</tr>
<tr>
<td>PTL-1</td>
<td>4750-0208</td>
<td>3&quot; pigtail assembly of RG-8/U with type N male connector on each end. TWO REQUIRED FOR EACH CON-OX KIT.</td>
<td>$29.00</td>
</tr>
<tr>
<td>DIPLEXER</td>
<td>3500-0007</td>
<td>A Diplexer for combining 2 transmitter outputs to one antenna, ferrite-type. Contact factory for details. (DB4391)</td>
<td>$1,109.00</td>
</tr>
<tr>
<td>ISOCOUPLER</td>
<td>3500-0008</td>
<td>Permits installation of STL/TSL antennas on AM tower. 950/450/150 MHz band. (Specify frequency.)</td>
<td>$845.00</td>
</tr>
<tr>
<td>ANT-TSL-1</td>
<td>3500-0009</td>
<td>SCALA CA5-450 5 element Yagi for 10dB gain (cut to frequency). 400-420/450-470/480-500 MHz.</td>
<td>$160.00</td>
</tr>
<tr>
<td>ANT-TSL-2</td>
<td>3500-0010</td>
<td>SCALA CA7-460 7-element Yagi for 10dB gain (broad band). 406-420/450-470/480-500 MHz.</td>
<td>$160.00</td>
</tr>
<tr>
<td>ANT-TSL-3</td>
<td>3500-0011</td>
<td>ANIXTER-MARK H450L (left hand polarization) and H450R (right hand polarization) Heliax antenna, circular polarization, operates 450-470 band, 12 dB gain. Recommended for areas where ice, snow and windloading are of concern.</td>
<td>$271.00 Antenna</td>
</tr>
</tbody>
</table>

TERMS OF SALE
All shipments are made F.O.B. Santa Clara, California. Terms are net 30 days to customers who have a satisfactory established line of credit with us. Others should arrange with the factory for payment at the time of shipment.

WARRANTY
'TFT', Inc. warrants each of the instruments of its manufacture to be produced to meet the specifications delivered to the BUYER, and to be free from defects in material and workmanship; and will repair or replace at its expense, for a period of one year from the date of delivery of equipment, any parts which are defective from faulty material or workmanship. Equipment, accessories, tubes and batteries not manufactured by TFT, Inc. are subject to only such warranties as those listed by the manufacturer.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charge prepaid by BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER, prior to such returns. Upon examination by the factory, if the instrument is found to be defective, the unit will be repaired and returned to the BUYER with transportation charge prepaid by SELLER.

Transportation charges for instruments found to be defective within the first thirty (30) days of the warranty period will be paid both ways by the SELLER. Transportation charges for warranty returns and repair costs, wherein failure is found not to be the fault of the SELLER, shall be paid both ways by the BUYER. This warranty does not apply to instruments which, in the opinion of the SELLER, have been altered or misused. No other warranty is expressed or implied. SELLER SPECIFICALLY EXCLUDES AND DISCLAIMS ANY WARRANTY FOR FITNESS OF PURPOSE AND MERCHANTABILITY. IN NO EVENT SHALL SELLER BE RESPONSIBLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES. Price subject to change without notice.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

3090 OAKMEAD VILLAGE DR., SANTA CLARA, CA 95051
INC
(408) 727-7272 TWX 910-338-0584
**PRICE SCHEDULE**  
**AURAL STUDIO-TRANSMITTER LINK & ASSOCIATED EQUIPMENT**  
**DOMESTIC**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
</table>
| SYSTEM A | Series 7700: 5115-7700A  
Series 8300: 5115-8300A | STL-All solid state composite transmitter and receiver, including self-contained power supplies, crystals, and tested to standard operating frequency. Specify exact operating frequency. | $6,715.00  
$8,150.00 |
| SYSTEM B | Series 7700: 5115-7700B  
Series 8300: 5115-8300B | STL-All solid state composite transmitter and receiver with "HOT" standby transmitter and receiver with 7770/7773 automatic switching, including self-contained AC power supplies, crystals, and tested to standard operating frequency. (Only two antennas required.) Specify exact operating frequency. | $14,895.00  
$17,765.00 |
| SYSTEM C | 5115-7700C | STL-All solid state single channel transmitter and receiver including self-contained AC power supplies, crystals, and tested to operating standard frequency. Specify exact operating frequency. | $6,350.00 |
| SYSTEM D | 5115-7700D | STL-All solid state channel transmitter and receivers with HOT standby transmitter and receiver with 7770/7773 automatic switching including self-contained AC power supplies, crystals and tested to standard operating frequency. (Only two antennas required.) Specify exact operating frequency. | $14,150.00 |
| SYSTEM E | 5115-7700E | STL-All solid state dual channel transmitters (2) and receivers (2) for separate left and right channel, including self-contained AC power supplies, crystals and tested to standard operating frequencies. System E requires three antennas—two transmit, one receiver (power divider included). See below for transmitter combiner for single transmit antenna operation. Specify exact operating frequencies. | $12,700.00 |

**NOTE:** For non-standard frequencies see below.

| MODEL 8100 | 5115-8100 | 450 MHz Transmitter - Studio Voice/Data Link. Specify FCC Group P frequency. | $3,995.00 |
| MODEL 8100 | 7100-3460 | Option -01 Automatic ID. | $295.00 |

| 7700 | 5116-7700 | Transmitter, only | $3,475.00 |
| 8300 | 5116-8300 | Transmitter, only | $4,250.00 |
| 7707 | 5116-7707 | Composite Receiver, only | $3,275.00 |
| 8301 | 5116-8301 | Composite Receiver, only | $4,050.00 |
| 7705 | 5116-7705 | Monaural Receiver, only | $2,925.00 |
| 7770 | 5116-7770 | Transmitter Automatic Changeover Unit, with coaxial changeover relay, and three-foot interconnecting cables to transmitter. | $815.00 |
| 7773 | 5116-7773 | Receiver Automatic Changeover Unit, with RF power divider, and three foot interconnect cables to receivers. | $760.00 |
| Option 15 | 7100-3710 | Stereo demodulator module, for 8301, 7707, 7713, or 7723 receivers. | $400.00 |
| Option 16 | 7100-3790 | Extended Baseband Response, permits Composite STL to convey 92 kHz SCA channel, for 8301, 7707, 7713, or 7723. | $350.00* |
| Option 20 | 7100-3640 | Narrow Band IF (Canada). Total carrier frequency deviation ± 25.5 KHz. | $325.00 |
| Option 21 | 7100-3650 | Narrow Band IF (Canada). Total carrier frequency deviation ± 11.5 KHz. | $325.00 |
| SCA-01 | 5116-SCA1 | Standalone Subcarrier Generator for data transmission (specify frequency). | $725.00 |
| SCA-02 | 5116-SCA2 | Standalone Subcarrier Detector for data transmission (specify frequency). | $725.00 |
| SCA-03 | 5116-SCA3 | Standalone Subcarrier Generator and Detector for data transmission (specify frequency). | $950.00 |
| 7100-3760 | Non-standard frequency for 7700 Series (specify exact frequency desired). For transmitter/receiver pair. | $230.00* |
| 7100-3700 | Non-standard frequency for 8300 Series (specify exact frequency desired). For transmitter/receiver pair. | $260.00* |
| Option 04 | 7100-3500 | Spare parts kit for 7700 Series, contains field replaceable parts | $305.00 |
| Option 01 | 7100-3780 | Spare parts kit for 8300 Series, contains field replaceable parts | $420.00 |

For other Options, such as, use of TFT STL equipment with that manufactured by others contact factory direct.

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* Not field installer  
(Additional Retrofit Charge. Contact Factory or Representative.)  
** Add 15% to List Price of Options When Ordered Separately.
<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL</td>
<td>DESCRIPTION</td>
<td>APPLICATION</td>
<td>PRICE</td>
</tr>
<tr>
<td>7601</td>
<td>10-channel Raise and Lower functions plus 10 channels of digital telemetry,</td>
<td>To provide economical digital remote control to AM&amp;FM stations</td>
<td>$2,195.00</td>
</tr>
<tr>
<td></td>
<td>consisting of a control terminal and a remote terminal.</td>
<td>(up to a maximum of 10 channels)</td>
<td></td>
</tr>
<tr>
<td>Option 01</td>
<td>Sub-carrier (SCA) Detector; for FM use 67 kHz. Other frequencies from 26</td>
<td>To provide demodulation of the SCA subcarrier</td>
<td>$185.00</td>
</tr>
<tr>
<td></td>
<td>kHz to 185 kHz available. Mounts within 7601 Control or Remote Terminal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 02</td>
<td>Sub-carrier (SCA) Generator; for FM use 67 kHz. Other frequencies from 26</td>
<td>To generate the SCA subcarrier</td>
<td>$185.00</td>
</tr>
<tr>
<td></td>
<td>kHz to 185 kHz available. Mounts within 7601 Control or Remote Terminal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 03</td>
<td>Components for Remote Terminal Extender Cable</td>
<td>To provide mating connector and PC boards for customer constructed</td>
<td>$50.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>extension cable. Remote Terminal may be removed from the rack without</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>having to disconnect wirings to and from the transmitter and sensors. (Wire</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>not included)</td>
<td></td>
</tr>
<tr>
<td>Option 04</td>
<td>Spare Parts Kit</td>
<td>To provide spare parts such as relays, and I.C.'s for emergency repair</td>
<td>$320.00</td>
</tr>
<tr>
<td>Option 05</td>
<td>10 channel Status Light</td>
<td>To provide 10 channels of independent status light indicators at both the</td>
<td>$545.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>control and remote terminals.</td>
<td></td>
</tr>
<tr>
<td>MODEL</td>
<td>DESCRIPTION</td>
<td>APPLICATION</td>
<td>PRICE</td>
</tr>
<tr>
<td>7601-C</td>
<td>Control portion only of 7601 system</td>
<td>To provide an alternate control location for 7601</td>
<td>$1,100.00</td>
</tr>
<tr>
<td>MODEL</td>
<td>DESCRIPTION</td>
<td>APPLICATION</td>
<td>PRICE</td>
</tr>
<tr>
<td>7601R</td>
<td>Remote portion only of 7601 system</td>
<td>For use at each additional remote site (up to 16)</td>
<td>$1,320.00</td>
</tr>
<tr>
<td>MODEL</td>
<td>DESCRIPTION</td>
<td>APPLICATION</td>
<td>PRICE</td>
</tr>
<tr>
<td>7610</td>
<td>10 channel RAISE/LOWER Plus 10 channel Telemetry</td>
<td>To provide digital remote control systems for medium and large size AM, FM</td>
<td>$3,495.00</td>
</tr>
<tr>
<td></td>
<td>digital remote control system. Expandable by adding Model 7615, 7620, 7630</td>
<td>&amp; TV stations. Also suitable for controlling multi-site operations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>to a 110-channel system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 01</td>
<td>Sub-carrier (SCA) Detector; for TV application, specify 39 kHz, for FM 67</td>
<td>To provide demodulation of the SCA subcarrier</td>
<td>$185.00</td>
</tr>
<tr>
<td></td>
<td>kHz, Other frequencies 26 kHz to 185 kHz available. Mounts within 7610</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control or Remote Terminal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 02</td>
<td>Sub-carrier (SCA) Generator; for TV use, specify 39 kHz; for FM, 67 kHz,</td>
<td>To generate the SCA sub-carrier</td>
<td>$185.00</td>
</tr>
<tr>
<td></td>
<td>Other frequencies 26 kHz to 185 kHz available. Mounts within 7610 Control</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>or Remote terminal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 03</td>
<td>BCD parallel data inputs (for the Remote Terminal)</td>
<td>To provide two channels of parallel BCD inputs to accept external digital</td>
<td>$190.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>data such as the readings from a digital frequency monitor or frequency</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>counter.</td>
<td></td>
</tr>
<tr>
<td>Option 04</td>
<td>Parallel BCD Data Output Cable Kit (for 7610C Control Terminal)</td>
<td>A cable kit to provoke external control of channel selection, RAISE/LOWE</td>
<td>$75.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RER FUNCTION and parallel BCD output of the channel identification and DVM</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>reading.</td>
<td></td>
</tr>
<tr>
<td>Option 05</td>
<td>Components for Remote Terminal Extender Cable</td>
<td>To provide mating connector and PC boards for customer constructed</td>
<td>$50.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>extension cable. Remote Terminal may be removed from the rack without</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>having to disconnect wirings to and from the transmitter sensors. (Wire not</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>included)</td>
<td></td>
</tr>
<tr>
<td>MODEL</td>
<td>DESCRIPTION</td>
<td>APPLICATION</td>
<td>PRICE</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>7610 (con't)</td>
<td>Option 06 Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.'s and other critical components for emergency repair.</td>
<td>$395.00</td>
</tr>
<tr>
<td></td>
<td>Option 07 Spare Parts Kit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MODEL 7610-C</td>
<td>Control portion only of 7610 system</td>
<td>To provide an alternate control location for 7610</td>
<td>$1,750.00</td>
</tr>
<tr>
<td>MODEL 7610-R</td>
<td>Remote portion only of 7610 system</td>
<td>For use at each additional remote site up to 16</td>
<td>$2,100.00</td>
</tr>
<tr>
<td>MODEL 7616</td>
<td>Manual Site Selector</td>
<td>Selects one of sixteen sites and performs command and telemetry functions on Model 7610 system without causing interference from one site to the other.</td>
<td>$2,950.00</td>
</tr>
<tr>
<td>MODEL 7620-R</td>
<td>Channel Expander (10 channels)</td>
<td>To expand the RAISE/LOWER and Telemetry channels of the Model 7610 from 10 each to 20 each (to be installed at the Remote Terminal only)</td>
<td>$975.00</td>
</tr>
<tr>
<td></td>
<td>Option 01 Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.'s and other critical components for emergency repair</td>
<td>$155.00</td>
</tr>
<tr>
<td></td>
<td>Option 02 Components for Remote Terminal Extender Cable</td>
<td>To provide mating connector and PC boards for customer constructed extension cable. Remote Terminal may be removed from the rack without having to disconnect wirings to and from the transmitter and sensors. (Wire not included)</td>
<td>$50.00</td>
</tr>
<tr>
<td>MODEL 7630R</td>
<td>Channel Expander (20 channels)</td>
<td>To expand the RAISE/LOWER and Telemetry channels of the Model 7610 from 10 each to 30 each (to be installed at the Remote Terminal only)</td>
<td>$1,450.00</td>
</tr>
<tr>
<td></td>
<td>Option 01 Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.'s critical components for emergency repair</td>
<td>$220.00</td>
</tr>
<tr>
<td></td>
<td>Option 02 Components for Remote Terminal Extender Cable</td>
<td>To provide mating connector and PC boards for customer constructed extension cable. Remote Terminal may be removed from the rack without having to disconnect wirings to and from the transmitter and sensors. (Wire not included)</td>
<td>$50.00</td>
</tr>
<tr>
<td>MODEL 7841</td>
<td>Automatic Sequential Site Selector</td>
<td>Selects multiple remote sites in sequence for Model 7840 up to 4 sites automatically</td>
<td>$2,950.00</td>
</tr>
<tr>
<td>MODEL 7815</td>
<td>Status and Control System with 15 ON/OFF control and 15 status indication channels, consisting of a Control and Remote unit.</td>
<td>For ON/OFF control and status indications only. Expandable from 15 to 45 channels of control and from 15 to 79 channels of status by the addition of Models 7830 and 7832.</td>
<td>$2,250.00</td>
</tr>
<tr>
<td></td>
<td>Option 01 Time Share Capability</td>
<td>Timeshare to Telco link on STL/SCA links is possible through an existing remote control system without affecting remote operation.</td>
<td>RPO</td>
</tr>
<tr>
<td></td>
<td>Option 02 Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.'s and other critical components for emergency repair.</td>
<td>$325.00</td>
</tr>
<tr>
<td></td>
<td>Option 03 Momentary Switch Kit</td>
<td>8 momentary switches and instructions for replacing front panel toggle switches. Field Installation Only</td>
<td>$35.00</td>
</tr>
<tr>
<td></td>
<td>*Option 04 Inverting Status Input</td>
<td>To provide inverting status to the inputs of the status lights.</td>
<td>$125.00</td>
</tr>
<tr>
<td></td>
<td>*Option 05 Electronic Interlock</td>
<td>To provide electronic interlocking capabilities in two groups of two to eight channels to failsafe human error.</td>
<td>$545.00</td>
</tr>
</tbody>
</table>

*Not Field Installable
<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODEL 7815-C</td>
<td>Control portion of 7815 system</td>
<td>To provide an alternate control location for 7815</td>
<td>$1,125.00</td>
</tr>
<tr>
<td>MODEL 7815-R</td>
<td>Remote portion only of 7815 system</td>
<td>For use at each additional remote site (up to 16)</td>
<td>$1,350.00</td>
</tr>
<tr>
<td>MODEL 7830</td>
<td>Direct ON/OFF Control and Status monitoring</td>
<td>When operated in conjunction with the Model 7610, it provides 15 channels of direct ON/OFF control plus 15 channels of status indicators. Also acts as expansion unit to 7815 providing 15 to 30 additional control and status channels.</td>
<td>$2,075.00</td>
</tr>
<tr>
<td>Option 01</td>
<td>Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.'s and other critical components for emergency repair.</td>
<td>$275.00</td>
</tr>
<tr>
<td>Option 02</td>
<td>Inverting Status Input</td>
<td>To provide inverting logic to the inputs of the status lights.</td>
<td>$120.00</td>
</tr>
<tr>
<td>Option 03</td>
<td>Momentary Switch Kit</td>
<td>The kit consists of 8 momentary switches and instructions for replacing front panel toggle switches, Field Installation Only</td>
<td>$35.00</td>
</tr>
<tr>
<td>MODEL 7830-C</td>
<td>Control portion only of 7830 system</td>
<td>For use at an alternate control location</td>
<td>$1,040.00</td>
</tr>
<tr>
<td>MODEL 7830-R</td>
<td>Remote portion only of 7830 system</td>
<td>For use at each additional remote site</td>
<td>$1,245.00</td>
</tr>
<tr>
<td>MODEL 7832</td>
<td>32 Channel Status/Alarm</td>
<td>Can be used with Models 7610 or 7815 to provide an additional 32 to 64 channels of Status/Alarm.</td>
<td>$1,700.00</td>
</tr>
<tr>
<td>Option 01</td>
<td>Spare Parts Kit</td>
<td>To provide spare parts such as relay's, I.C.'s and other critical components for emergency repair.</td>
<td>$220.00</td>
</tr>
<tr>
<td>Option 02</td>
<td>Inverting Status Input</td>
<td>To provide inverting logic to the inputs of the status lights.</td>
<td>$120.00</td>
</tr>
<tr>
<td>MODEL 7832-C</td>
<td>Control portion only of 7832 system</td>
<td>For use at an alternate control location</td>
<td>$850.00</td>
</tr>
<tr>
<td>MODEL 7832-R</td>
<td>Remote portion only of 7832 system</td>
<td>For use at each additional remote site</td>
<td>$1,020.00</td>
</tr>
<tr>
<td>MODEL 7840</td>
<td>COMPUSCAN (CPU, Printer and Scanner)</td>
<td>A micro-computer based data acquisition, limit alarm and logging system. Capable of 20-60 channels of logging, the 7840 may be used to assist existing remote control equipment or as a stand alone system.</td>
<td>$8,300.00</td>
</tr>
<tr>
<td>Option 01</td>
<td>CTR &amp; Keyboard</td>
<td>A 15-inch B &amp; W CRT displays 120 channels of data in groups of 30 per page. Instructions are entered through accompanying typewriter keyboard.</td>
<td>$5,000.00</td>
</tr>
<tr>
<td>Option 02</td>
<td>CRT Rack Mount</td>
<td>Allows rack mount of CRT data terminal</td>
<td>$175.00</td>
</tr>
<tr>
<td>Option 03</td>
<td>Spare Parts Kit (7840 C &amp; R)</td>
<td>Spare parts for CPU and Scanner</td>
<td>$450.00</td>
</tr>
<tr>
<td>Option 04</td>
<td>Channel Scanner Board</td>
<td>One required for every 10 telemetry channels monitored</td>
<td>$275.00</td>
</tr>
<tr>
<td>MODEL 7840-C</td>
<td>CPU</td>
<td>Microprocessor based CPU</td>
<td>$4,800.00</td>
</tr>
</tbody>
</table>

*Not Field Installable
<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>7840-R</td>
<td>Scanner</td>
<td>For use at each additional remote site (up to 16)</td>
<td>$4,200.00</td>
</tr>
</tbody>
</table>

### REMOTE CONTROL INTERFACING ACCESSORIES

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSU-01</td>
<td>Fail Safe Unit for TV application</td>
<td>To provide full compliance with FCC Rules by monitoring 4 critical parameters: aural plate voltage, aural plate current, aural power and visual power.</td>
<td>$520.00</td>
</tr>
<tr>
<td>ADS-01</td>
<td>Alternate Data Path Selector</td>
<td>Switch from SCA to phone line when invalid data is detected from either the Control or the Remote terminal. Both local and remote units are included. Single ADS also available.</td>
<td>$965.00</td>
</tr>
<tr>
<td>CSA-01</td>
<td>Chopper Amplifier</td>
<td>To provide isolation from a floating circuit to a grounded circuit. DC gain is also provided.</td>
<td>$175.00</td>
</tr>
<tr>
<td>PLC-01</td>
<td>Power-to-Linear Converter</td>
<td>To linearize power readings from log scale to linear scale.</td>
<td>$295.00</td>
</tr>
<tr>
<td>TLK-01</td>
<td>Tower Light Monitor</td>
<td>To monitor AC line current</td>
<td>$95.00</td>
</tr>
<tr>
<td>LVK-01</td>
<td>Line Voltage Monitor</td>
<td>To monitor AC line voltage</td>
<td>$80.00</td>
</tr>
<tr>
<td>TSK-01</td>
<td>Temperature Sensing Kit</td>
<td>To monitor temperature of air or components</td>
<td>$145.00</td>
</tr>
<tr>
<td>MBB-01</td>
<td>Isolation amplifier (High Voltage)</td>
<td>For monitoring voltage and current at 10kv above ground and translate reading in reference to ground voltage to suit the input of the Remote Terminals</td>
<td>$135.00</td>
</tr>
</tbody>
</table>

### TERMS OF SALE

All shipments are made F.O.B. Santa Clara, California. Terms are net 30 days to customers who have a satisfactory established line of credit with us. Others should arrange with the factory for payment at the time of shipment.

### WARRANTY

Time and Frequency Technology, Inc. warrants each of the instruments of its manufacture to be produced to meet the specifications delivered to the BUYER; and to be free from defects in material and workmanship; and will repair or replace at its expense, for a period of one year from the date of delivery of equipment, any parts which are defective from faulty material or workmanship.

Equipment, accessories, tubes and batteries not manufactured by TFT are subject to only such warranties as those listed by the manufacturer.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charge prepaid by BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER, prior to such returns. Upon examination by the factory, if the instrument is found to be defective, the unit will be repaired and returned to the BUYER, with transportation charge prepaid by SELLER.

Transportation charges for instruments found to be defective within the first thirty (30) days of the warranty period will be paid both ways by the SELLER.

Transportation charge for warranty returns and repair costs, wherein failure is found not to be the fault of the SELLER, shall be paid both ways by the BUYER.

This warranty does not apply to instruments which, in the opinion of the SELLER, have been altered or misused. No other warranty is expressed or implied. We are not liable for consequential damages.

Price subject to change without notice.

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**TIME AND FREQUENCY TECHNOLOGY, INC.**

3090 OAKMEAD VILLAGE DR., SANTA CLARA, CA. 95051 (408)246.6365 TWX 910.338.0584
## PRICE SCHEDULE

**STL/TSL ANTENNAS, COAXIAL TRANSMISSION LINE AND CONNECTOR KITS**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>P372GRN-M1</td>
<td>3500-0016</td>
<td>ANIXTER-MARK Grid Parabolic Antenna, six-foot diameter, for 890-960 MHz, type N female connector, 50 ohm (1.3:1 VSWR standard, 15:1 special order), non-pressurized feed, vertical or horizontal polarization for mounting to 1.9 to 3.5 inch diameter O.D. pipe. (Other mounts on special order.) Gain 22.0 dBi-wideband.</td>
<td>$1,060.00</td>
</tr>
<tr>
<td>PR-450U</td>
<td>3500-0001</td>
<td>SCALA Paraflector™, Parabolic Antenna, for 350-1000 MHz, type N female connector, 50 ohm, universal mounting for vertical or horizontal polarization. Gain 20.1 dBi at 950 MHz.</td>
<td>$500.00</td>
</tr>
<tr>
<td>SH872GN</td>
<td>3500-0017</td>
<td>ANIXTER-MARK Multi-element Grid Parabolic Section Antenna (72” x 36”), for 675-960 MHz, type N female connector, 50 ohm, vertical or horizontal polarization, for mounting up to 3.5 inch round member. Gain 18.6 dBi at 950 MHz.</td>
<td>$485.00</td>
</tr>
<tr>
<td>MF 960</td>
<td>3500-0002</td>
<td>SCALA MiniParabolic™ Antenna for 840-960 MHz, 18.1 dBi gain, type N female connector, universal mounting for vertical or horizontal polarization, fully anodized. (Not recommended for congested areas.)</td>
<td>$300.00</td>
</tr>
<tr>
<td>MG-944GN</td>
<td>3500-0018</td>
<td>ANIXTER-MARK Mini Grid Parabolic Section Antenna (44” x 13.5”), for 890-960 MHz, type N female connector, 50 ohm, vertical or horizontal polarization, for mounting up to 3.5 inch round member. Gain 13.5 dBi at 950 MHz.</td>
<td>$245.00</td>
</tr>
<tr>
<td>COX-01</td>
<td>3500-0003</td>
<td>ANDREW Heliax® LDF4-50 Transmission Line 1/2” foam Dielectric, 50 ohm, jacketed.</td>
<td>$1.70 per ft.</td>
</tr>
<tr>
<td>CON-01</td>
<td>3500-0004</td>
<td>Connector Kit for LDF4-50 Andrew Heliax® consisting of two (2) Andrew type L44N female connectors. Two (2) PTL-1 or equivalent needed for normal installation.</td>
<td>$42.00</td>
</tr>
<tr>
<td>COX-03</td>
<td>3500-0012</td>
<td>CABLEWAVE FLC-12-505 1/2” Low Loss Foam Wellflex Coaxial Cable, foam Dielectric, 50 ohm, jacketed.</td>
<td>$1.50 per ft.</td>
</tr>
<tr>
<td>CON-03</td>
<td>3500-0013</td>
<td>Connector Kit for FLC-12-505 Cabelwave, consists of two (2) Cabelwave Part No. 738801, type N female connectors. Two (2) PTL-1 or equivalent needed for normal installation. One kit required for each length of FLC-12-505.</td>
<td>$40.00</td>
</tr>
<tr>
<td>COX-02</td>
<td>3500-0005</td>
<td>ANDREW Heliax® LDF5-50 Transmission Line 7/8” foam Dielectric, 50 phm, jacketed.</td>
<td>$4.30 per ft.</td>
</tr>
<tr>
<td>CON-02</td>
<td>3500-0006</td>
<td>Connector Kit for LDF5-50 Andrew Heliax® consisting of two (2) Andrew type female connectors. Two (2) PTL-1 or equivalent needed for normal installation. One kit required for each length of FLC-50-505.</td>
<td>$99.00</td>
</tr>
<tr>
<td>COX-04</td>
<td>3500-0014</td>
<td>CABLEWAVE FLC-78-505 7/8” Low Loss Wellflex Coaxial Cable, foam Dielectric, 50 ohm, jacketed.</td>
<td>$4.70 per ft.</td>
</tr>
<tr>
<td>CON-04</td>
<td>3500-0015</td>
<td>Connector Kit for Cabelwave FLC-78-505, consists of two (2) Cabelwave Part No. 738829, type N female connectors. Two (2) PTL-1 or equivalent needed for normal installation. One kit required for each length of FLC-78-505.</td>
<td>$99.00</td>
</tr>
<tr>
<td>PTL-1</td>
<td>4750-0208</td>
<td>3&quot; pigtail assembly of RG-8U with type N male connector on each end. TWO REQUIRED FOR EACH CON-OX KIT.</td>
<td>$29.00</td>
</tr>
<tr>
<td>DIPLER</td>
<td>3500-0007</td>
<td>A Diplexer for combining 2 transmitter outputs to one antenna, ferrite-type. Contact factory for details. (DB4391)</td>
<td>$1,105.00</td>
</tr>
<tr>
<td>ISOUPLER</td>
<td>3500-0008</td>
<td>Permits Installation of STL/TSL antennas on AM tower. 950/450/150 MHz band. (Specify frequency.)</td>
<td>$845.00</td>
</tr>
<tr>
<td>ANT-TSL-1</td>
<td>3500-0009</td>
<td>SCALA CAS-450 5 element Yagi for 10dB gain (out to frequency). 406-420/450-470/480-500 MHz.</td>
<td>$160.00</td>
</tr>
<tr>
<td>ANT-TSL-2</td>
<td>3500-0010</td>
<td>SCALA CAT-450 7 element Yagi for 10dB gain (broad band). 406-420/450-470/480-500 MHz.</td>
<td>$160.00</td>
</tr>
<tr>
<td>ANT-TSL-3</td>
<td>3500-0011</td>
<td>ANIXTER-MARK H450L (left hand polarization) and H450R (right hand polarization) Heliax antenna, circular polarization, operates 450-470 band, 12 dB gain. Recommended for areas where loe, snow and windloading are of concern.</td>
<td>$271.00 Antenna</td>
</tr>
</tbody>
</table>

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## TERMS OF SALE

All shipments are made F.O.B. Santa Clara, California. Terms are net 30 days to customers who have a satisfactory established line of credit with us. Others should arrange with the factory for payment at the time of shipment.

### WARRANTY

TPT, Inc. warrants each of the instruments of its manufacture to be produced to meet the specifications delivered to the BUYER and to be free from defects in material and workmanship and will repair or replace at its expense, for a period of one year from the date of delivery of equipment, any part which is defective from faulty material or workmanship. Equipment, accessories, tubes and batteries not manufactured by TPT, Inc. are subject to only such warranties as those listed by the manufacturer.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charge prepaid by BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER, prior to such returns. Upon examination by the factory, if the instrument is found to be defective, the unit will be repaired and returned to the BUYER. With transportation charge prepaid by SELLER.  

Transportation charges for instruments found to be defective within the first thirty (30) days of the warranty period will be paid both ways by the BUYER. Transportation charges for warranty returns and repair costs, wherein failure is found not to be the fault of the SELLER, shall be paid both ways by the BUYER. This warranty does not apply to instruments which, in the opinion of the SELLER, have been altered or mistuned. No other warranty is expressed or implied. SELLER SPECIFICALLY EXCLUDES AND DISCLAIMS ANY WARRANTY FOR FITNESS OF PURPOSE AND MERCHANTABILITY. IN NO EVENT SHALL SELLER BE RESPONSIBLE FOR ANY CONSEQUENTIAL, OR INCIDENTAL DAMAGES. Price subject to change without notice.

### PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

3090 OAKMEAD VILLAGE DR., SANTA CLARA, CA 95051

INC (408) 727-7727 TWX 910-338-0584

STL 12 84 2 DM
## PRICE SCHEDULE

**Effective November 26, 1984**

**AURAL STUDIO-TRANSMITTER LINK & ASSOCIATED EQUIPMENT**

**DOMESTIC**

<table>
<thead>
<tr>
<th>MODEL</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYSTEM A</td>
<td>Series 7700: 5115-7700A</td>
<td>STL-All solid state composite transmitter and receiver, including self-contained power supplies, crystals, and tested to standard operating frequency. Specify exact operating frequency.</td>
<td>$ 6,715.00</td>
</tr>
<tr>
<td></td>
<td>Series 8300: 5115-8300A</td>
<td>$ 8,150.00</td>
<td></td>
</tr>
<tr>
<td>SYSTEM B</td>
<td>Series 7700: 5115-7700B</td>
<td>STL-All solid state composite transmitter and receiver with &quot;HOT&quot; standby transmitter and receiver with 7770/7773 automatic switching, including self-contained AC power supplies, crystals, and tested to standard operating frequency. (Only two antennas required.) Specify exact operating frequency.</td>
<td>$ 14,895.00</td>
</tr>
<tr>
<td></td>
<td>Series 8300: 5115-8300B</td>
<td>$ 17,765.00</td>
<td></td>
</tr>
<tr>
<td>SYSTEM C</td>
<td>5115-7700C</td>
<td>STL-All solid state single channel transmitter and receiver including self-contained AC power supplies, crystals, and tested to operating standard frequency. Specify exact operating frequency.</td>
<td>$ 6,350.00</td>
</tr>
<tr>
<td>SYSTEM D</td>
<td>5115-7700D</td>
<td>STL-All solid state channel transmitter and receivers with HOT standby transmitter and receiver with 7770/7773 automatic switching including self-contained AC power supplies, crystals and tested to standard operating frequency. (Only two antennas required.) Specify exact operating frequency.</td>
<td>$ 14,150.00</td>
</tr>
<tr>
<td>SYSTEM E</td>
<td>5115-7700E</td>
<td>STL-All solid state dual single channel transmitters (2) and receivers (2) for separate left and right channel, including self-contained AC power supplies, crystals and tested to standard operating frequencies. System E requires three antenna—two transmit, one receiver (power divider included). See below for transmitter combiner for single transmit antenna operation. Specify exact operating frequencies.</td>
<td>$ 12,700.00</td>
</tr>
</tbody>
</table>

**NOTE:** For non-standard frequencies see below.

<table>
<thead>
<tr>
<th>MODEL 8100</th>
<th>PART NUMBER</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8100</td>
<td>5115-8100</td>
<td>450 MHz Transmitter - Studio Voice/Data Link. Specify FCC Group P frequency.</td>
<td>$ 3,995.00</td>
</tr>
<tr>
<td>8100</td>
<td>7100-3460</td>
<td>Option - 01 Automatic ID.</td>
<td>$ 295.00</td>
</tr>
</tbody>
</table>

**NOTE:** For non-standard frequencies see below.

| 7700       | 5116-7700   | Transmitter, only                                                          | $ 3,475.00 |
| 8300       | 5116-8300   | Transmitter, only                                                          | $ 4,250.00 |
| 7707       | 5116-7707   | Composite Receiver, only                                                   | $ 3,275.00 |
| 8301       | 5116-8301   | Composite Receiver, only                                                   | $ 4,050.00 |
| 7705       | 5116-7705   | Monaural Receiver, only                                                    | $ 2,825.00 |
| 7770       | 5116-7770   | Transmitter Automatic Changeover Unit, with coaxial changeover relay, and three-foot interconnecting cables to transmitter. | $ 815.00  |
| 7773       | 5116-7773   | Receiver Automatic Changeover Unit, with RF power divider, and three foot interconnect cables to receivers. | $ 760.00  |
| Option 15  | 7100-3710   | Stereo demodulator module, for 8301, 7707, 7713, or 7723 receivers.        | $ 400.00  |
| Option 16  | 7100-3790   | Extended Baseband Response, permits Composite STL to convey 92 kHz SCA channel, for 8301, 7707, 7713, or 7723. | $ 350.00* |
| Option 20  | 7100-3640   | Narrow Band IF (Canada). Total carrier frequency deviation ± 25.5 KHz.   | $ 325.00  |
| Option 21  | 7100-3650   | Narrow Band IF (Canada). Total carrier frequency deviation ± 11.5 KHz.    | $ 325.00  |
| SCA-01     | 5116-SCA1   | Standalone Subcarrier Generator for data transmission (specify frequency). | $ 725.00  |
| SCA-02     | 5116-SCA2   | Standalone Subcarrier Detector for data transmission (specify frequency).  | $ 725.00  |
| SCA-03     | 5116-SCA3   | Standalone Subcarrier Generator and Detector for data transmission (specify frequency). | $ 950.00  |
| 7100-3760  |             | Non-standard frequency for 7700 Series (specify exact frequency desired). For transmitter/receiver pair. | $ 230.00* |
| 7100-3700  |             | Non-standard frequency for 8300 Series (specify exact frequency desired). For transmitter/receiver pair. | $ 260.00* |
| Option 04  | 7100-3500   | Spare parts kit for 7700 Series, contains field replaceable parts           | $ 305.00  |
| Option 01  | 7100-3780   | Spare parts kit for 8300 Series, contains field replaceable parts           | $ 420.00  |

*Not Field Installable
†(Additional Retrofit Charge. Contact Factory or Representative)
**Add 15% to List Price of Options When Ordered Separately.

For other Options, such as, use of TFT STL equipment with that manufactured by others contact factory direct.
Model X-14 Status and Control System

- 14 status channels
- 14 control functions
- Full digital circuitry
- 2 wire or 4 wire operation
- Unique "double-check" circuitry prevents false data
- Optional filter allows use on the same phone line as your Moseley Model TRC-15 AW Remote Control Equipment

DESCRIPTION

The TFT X-14 is a completely digital Status and Control System for remote monitoring and control applications in AM, FM and TV broadcasting. It consists of two, compact units: one for the control point and one for the remote point. Both have fourteen status channels, each with its own independent LED indicator. Either a switch closure or a logic level will trigger the status monitoring circuitry and cause the appropriate LED to go on. Any combination of ON/OFF can occur.

In addition, both units have fourteen front panel toggle switches for easy control of fourteen different ON/OFF functions. The remote unit also has a switch that converts it to local control for on-site work. Each toggle switch controls an individual, electronically latched relay. Relay contacts are Form A, and are uncommitted (not grounded). They are rated for AC or DC at 50 watts.

The X-14 uses FSK transmission techniques and transmits full duplex (simultaneously in both directions). However, since frequency division multiplex circuitry is built-in, you only need a half-duplex telephone line for actual transmission. Data modems are also built-in, and both control and status information are updated every 600 MS.

Data integrity is maintained by a unique system of "double scan/compare" logic. In operation, each digital word is sent twice to the remote unit, and both words are compared, bit for bit, in parallel. The output register is then updated only if every bit matches. This virtually eliminates the possibility of error in the status or control data.

Both the remote unit and the control unit of the X-14 system are housed in 3½" high rack-mounted enclosures. Barrier strips are provided on the remote unit for status input and control output connections. Additionally, a switch on the remote unit converts it to local control for on-site work.

APPLICATIONS

The TFT X-14 can be used wherever you need remote monitoring of operating parameters which have been reduced to go/no go, such as voltages, temperatures, pressures and levels. At the same time, it gives you the ability to directly control up to fourteen, separate ON/OFF functions at the remote point. These include things like filament voltage, plate voltage, main power, overload reset, tower lights and program source selection. Controls can be used either with the monitoring channels or independently.

The X-14 can also be used to economically expand monitoring and control in installations already using Moseley TRC-15 AW remote control equipment. An optional TFT line Multiplex Filter allows you to connect and operate both units on the same telephone line.

The TFT X-14 is just one of the all-digital TFT instruments designed to simplify and improve remote control in broadcast operations. Models are also available with 32 monitoring/control channels and for remote control of ENG antennas. TFT also manufactures a complete line of frequency and modulation monitors for AM, FM, FM Stereo and TV as well as receivers, encoders and decoders for Emergency Broadcast use. For a demonstration, contact your TFT representative or the factory.
SPECIFICATIONS

Command Channels . . . 14, toggle switch
Status Channels . . . . 14, LED indicator
Relay Outputs ......... 50 watt rating, 1A, max. for 28 VDC
Status Inputs ......... Dry contact closure, or TTL logic zero
Interconnect ......... Voice grade channel, 300 to 2600 Hertz, max. attenuation -30 dB.
Interconnect ......... 2 wire or 4 wire interconnect.
Power . . . . . . . 120 VAC ± 10%, 50 to 400 Hertz
Temperature . . . . 0°C (32°F) to 50°C (122°F)
Dimensions ......... 19” W (48.3 cm) x 3½” H (8.9 cm) x 10¼” D (26.7 cm)
**TV PRODUCTS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Model No.</th>
<th>Price</th>
<th>Lead Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>* MODEL 701 TV FREQUENCY &amp; AURAL MODULATION MONITOR, Rack Mount</td>
<td>701</td>
<td>$4,975</td>
<td>6-8 weeks</td>
<td></td>
</tr>
<tr>
<td>Options:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>02-Alarm (frequency and modulation)</td>
<td></td>
<td>150</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>03-SCA Output</td>
<td></td>
<td>150</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>04-AGC Meter (visual/aural carrier level)</td>
<td></td>
<td>125</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>05-Additional 5MHz Master Oscillator Assembly</td>
<td></td>
<td>320</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>06-Automatic Logging Output (BCD)</td>
<td></td>
<td>125</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>Model 725B Automatic Logging Adapter (analog output)</td>
<td></td>
<td>650</td>
<td>6-10 weeks</td>
<td></td>
</tr>
</tbody>
</table>

**MODEL 702 TV AURAL MODULATION MONITOR, RACK MOUNT**

| Options: | | | |
| 02-Alarm (modulation) | | 90 | stock |
| 03-SCA Output | | 150 | stock |
| 04-AGC Meter (visual/aural carrier level) | | 125 | stock |

**MODEL 704 Remote Meter and Peak Flasher Panel**

| Model 704A Remote Meter and Peak Flasher Panel | | 250 | stock |

**MODEL 735 STANDARD TIME & FREQUENCY RECEIVER, WWV/WWVH**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Model No.</th>
<th>Price</th>
<th>Lead Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>* MODEL 735 STANDARD TIME &amp; FREQUENCY RECEIVER</td>
<td>735</td>
<td>$485</td>
<td>4-6 weeks</td>
<td></td>
</tr>
</tbody>
</table>

**AM PRODUCTS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Model No.</th>
<th>Price</th>
<th>Lead Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE 713 AM FREQUENCY AND MODULATION MONITOR</td>
<td>713</td>
<td>$2,150</td>
<td>6-8 weeks</td>
<td></td>
</tr>
<tr>
<td>Options:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>01-Automatic Logging Output (BCD)</td>
<td></td>
<td>90</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>02-Automatic Logging Output (analog)</td>
<td></td>
<td>200</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>03-Telemetry Output (sub-audible)</td>
<td></td>
<td>90</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>04-Carrier-Level and Carrier-Off Alarm</td>
<td></td>
<td>50</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>05-Off-Frequency Alarm (420 Hz standard)</td>
<td></td>
<td>50</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>06-Off-Frequency Alarm (special; specify with order)</td>
<td></td>
<td>125</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>07-Absence-of-Modulation Alarm</td>
<td></td>
<td>175</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>09-10kHz Filter</td>
<td></td>
<td>90</td>
<td>stock</td>
<td></td>
</tr>
</tbody>
</table>

**MODEL 732 AM MODULATION MONITOR**

| Options: | | | |
| 03-Telemetry Output (sub-audible) | | 90 | stock |
| 04-Carrier-Level and Carrier-Off Alarm | | 90 | stock |
| 07-Absence-of-Modulation Alarm | | 175 | stock |
| 08-10kHz Filter | | 90 | stock |
| 09-Carrier Frequency Output | | 175 | stock |

**Model 704D Remote Meter and Peak Flasher Panel**

| Model 704D Remote Meter and Peak Flasher Panel | | 250 | stock |

**MODEL 751 RF AMPLIFIER**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Model No.</th>
<th>Price</th>
<th>Lead Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>* MODEL 735 STANDARD TIME &amp; FREQUENCY RECEIVER</td>
<td>735</td>
<td>$485</td>
<td>4-6 weeks</td>
<td></td>
</tr>
</tbody>
</table>

**FM PRODUCTS**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Model No.</th>
<th>Price</th>
<th>Lead Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>* MODEL 723 FM FREQUENCY AND MODULATION MONITOR</td>
<td>723</td>
<td>$2,250</td>
<td>6-8 weeks</td>
<td></td>
</tr>
<tr>
<td>Options:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>01-Automatic Logging Output (BCD)</td>
<td></td>
<td>90</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>02-Automatic Logging Output (analog)</td>
<td></td>
<td>190</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>05-Off-Frequency Alarm (+1 kHz standard)</td>
<td></td>
<td>90</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>06-Off-Frequency Alarm (special; specify with order)</td>
<td></td>
<td>125</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>07-Absence-of-Modulation Alarm</td>
<td></td>
<td>175</td>
<td>stock</td>
<td></td>
</tr>
</tbody>
</table>

**MODEL 734 FM MODULATION MONITOR**

| Options: | | | |
| 01-Absence-of-Modulation Alarm | | 175 | stock |
| 02-Carrier Frequency Output | | 175 | stock |

**Model 704B Remote Meter and Peak Flasher Panel**

| Model 704B Remote Meter and Peak Flasher Panel | | 250 | stock |

**MODEL 724 STEREO MONITOR**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Model No.</th>
<th>Price</th>
<th>Lead Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 704C Remote Meter Panel</td>
<td>704C</td>
<td>300</td>
<td>stock</td>
<td></td>
</tr>
<tr>
<td>Model 730 SCA MONITOR, 67 kHz</td>
<td>730</td>
<td>$1,350</td>
<td>6-8 weeks</td>
<td></td>
</tr>
<tr>
<td>Options: 01-Crystal for SCA #2, 41 kHz</td>
<td></td>
<td>95</td>
<td>stock</td>
<td></td>
</tr>
</tbody>
</table>

**MODEL 735 STANDARD TIME & FREQUENCY RECEIVER, WWV/WWVH**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Model No.</th>
<th>Price</th>
<th>Lead Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>* MODEL 735 STANDARD TIME &amp; FREQUENCY RECEIVER</td>
<td>735</td>
<td>$485</td>
<td>4-6 weeks</td>
<td></td>
</tr>
</tbody>
</table>

---

* WITH ORDER, PLEASE SPECIFY OPTIONS, CHANNEL NUMBER AND OFFSET OR FREQUENCY
* All prices are F.O.B., Santa Clara, California and subject to change without notice.
* Additional Manuals $10.00 per copy.

**TIME AND FREQUENCY TECHNOLOGY INC.**

3000 OLCOTT STREET  SANTA CLARA, CA. 95051  (408) 246-6365
TERMS OF SALE

All shipments are made F.O.B. Santa Clara, California. Terms are net 30 days to customers who have a satisfactory established line of credit with us. Others should arrange with the factory for payment at the time of shipment.

WARRANTY

TIME AND FREQUENCY TECHNOLOGY, INC. warrants each of the instruments of its manufacture to be produced to meet the specifications delivered to the BUYER; and to be free from defects in material and workmanship; and will repair or replace at its expense, for a period of one year from the date of delivery of equipment, any parts which are defective from faulty material or workmanship.

Instruments found to be defective during the warranty period shall be returned to the factory with transportation charges prepaid by BUYER. It is expressly agreed that replacement and repair shall be the sole remedy of BUYER with respect to any nonconforming equipment and parts thereof and shall be in lieu of any other remedy available by applicable law. All returns to the factory must be authorized by the SELLER, prior to such returns. Upon examination by the factory, if the instrument is found to be defective, the unit will be repaired and returned to the BUYER, with transportation charges prepaid by SELLER.

Transporation charges for instruments found to be defective within the first thirty (30) days of the warranty period will be paid both ways by the SELLER.

Transportation charges for warranty returns and repair costs, wherein failure is found not to be the fault of the SELLER, shall be paid both ways by the BUYER.

This warranty does not apply to instruments which, in the opinion of the SELLER, have been altered or misused.

No other warranty is expressed or implied. We are not liable for consequential damages.
**GENERAL**

TFT monitors are all-solid-state, and are optimized for off-the-air or direct-connection monitoring. Since an RF amplifier isn't needed for off-the-air use, interference from intermodulation products is virtually eliminated.

**Modulation: Models 701 and 702**

Both the Model 701 and the Model 702 have a peak reading modulation meter as well as two digitally settable flashers that display plus and minus peaks simultaneously. Flasher accuracy and resolution are such that modulation can be set at the maximum allowable without fear of exceeding FCC limits. A Remote Meter and Flasher Panel is available as an accessory (Model 704).

**Frequency: Models 709 and 701**

These instruments monitor aural, visual and intercarrier frequency. Very high stability is provided by a proportional-oven crystal oscillator with an aging rate of $3 \times 10^{-8}$/day or 1 ppm/year. An accessory, super stable oscillator with an aging rate of $1 \times 10^{-9}$/day is also available. Both the Model 709 and the Model 701 can be calibrated directly against WWV using a TFT Model 735, any WWV receiver or the color subcarrier transmitted by the networks. A rubidium standard can also be used as the time base via rear panel connectors.

Accessories include the Super Stable Time Base (Model 703); an Automatic Logging Adapter (Model 725B); and a WWV Receiver (Model 735).

**Frequency and Modulation:** Model 701

- Remote monitoring of UHF & VHF channels
- 250 uv sensitivity
- Complete in-house monitoring for maximum convenience
- Eliminates outside service costs and allows self-checking at any time for absolute certainty.

**Aural Modulation**

- Digitally settable peak flashers display plus and minus peaks simultaneously
- Built-in high accuracy aural modulation calibrator
- Remote meter and flasher outputs provided
- Optional SCA output
- Provision for checking aural carrier only
- Illuminated meter scale

**Frequency**

- Digitally displays frequency errors
- Needs calibration only every 6 months (UHF) or every 18 months (VHF)
- Can be calibrated directly against NBS with WWV receiver
- Digital or analog automatic logging outputs available
- Usable as precise, 6 digit frequency counter to 10 MHz.

**Modulation Only:** Model 702

- Combines all modulation features of Model 701 in a single, portable or rack mount instrument

**Frequency Only:** Model 709

- Combines all frequency features of Model 701 in a single, rack mount instrument

FOR MORE INFORMATION

For full data sheets and/or a demonstration, just complete and return the enclosed postage-free card. Or contact us direct. TFT representatives are located throughout the U.S. and Canada.

TFT TIME AND FREQUENCY TECHNOLOGY, INC.

3000 OLCOTT STREET, SANTA CLARA, CA 95051 (408) 246-6365
FEATURES
- Fully digital, pulse code modulated FSK modems
- 10 channels of RAISE/LOWER and TELEMETRY functions, expandable to 50 channels
- Up to 30 channels of direct control ON/OFF functions
- Up to 30 channels STATUS and ALARM
- Linked by telephone wire line, STL and SCA, or sub-audible telemetry
- Multi-channel data display
- Limit alarms and automatic logging
- Quick disconnect of Barrier-strip board for ease of service
- Provision for ATS Operation

30 channels of STATUS/ALARM. Automatic logging is optionally available. Furthermore, tolerance alarm and multi-channel data display can be added on as accessory equipment.

The 7600 series can be interconnected by a telephone line or radio links including STL, SCA and sub-audible telemetry. The system uses Pulse Code Modulation for data transmission including built-in data modems. A TFT proprietary scheme of digital data filtering is incorporated to provide maximum data integrity. This technique employs a method of sending each control command twice and checking for a match of each redundant data before updating the control relays. The TFT Model 7600 series meets both the FCC control and telemetry failsafe requirements.

Another TFT first in providing good human engineering in its design is the "quick disconnect" capability of the remote units. This feature allows the remote units to be removed from the rack without disconnecting any of the wires to or from the transmitting facilities. The rear panel of the remote units can be removed from the chassis by loosening 4 thumbscrews, should servicing of the chassis become necessary.
SYSTEM SPECIFICATIONS

Data Transmission . . . . Digital pulse code modulated FSK Modems
System Capacity . . . . Up to 50 channels of momentary RAISE/LOWE R and TELEMETRY. Up to 30 channels of on/off direct control and status/alarm
Telemetry Accuracy . . . . 0.1% of reading
Resolution . . . . . . . . . . . . . . one part in 1000.
Telemetry Update . . . . 3 up dates per second. Up date every 3 seconds with sub-audible telemetry.
Telemetry Input . . . .
  Input Voltage . . . . 1 V DC with a 200% overrange
  Common mode voltage . ±350 V DC
  Input impedance . . . . . . . . 50 k ohms
  Input isolation . . . . . . . . optically isolated

Interconnect Requirements
  Telephone line . . . . 2 wire unconditioned, Series 3002 Data Circuit.
  Audio channel . . . . Any voice grade channel having 300 Hz to 3 kHz bandwidth
  Radio (STL) . . . . . . Plug-in FM subcarrier modulator and demodulator for command link.
  Radio (off-air) . . . . SCA frequencies or sub-audible for the telemetry return.
Control Output . . . . Relay contact closure, isolated, AC / DC rated, 50-watt non-inductive.
  Fail-safe Control . . . . 30-second delay, normally closed relay contacts.
  Fail-safe telemetry . . Output for driving external one-hour timer and TV fail-safe units for full compliance with FCC Rule 73.676
Power . . . . . . . . . . . . . . 120/240 V AC 50-400 Hz
Operating Temperature . . . . . . . . . . . . 0° to 50° C.

SIZE AND WEIGHT

<table>
<thead>
<tr>
<th>Model</th>
<th>19&quot; rack size</th>
<th>Weight in lbs.</th>
<th>Power in watts</th>
<th>No. of Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>7610</td>
<td>3½ H</td>
<td>14</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>7615</td>
<td>3½ H</td>
<td>12</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>7630</td>
<td>5¼ H</td>
<td>6</td>
<td>from Model 7610</td>
<td>1</td>
</tr>
<tr>
<td>7650</td>
<td>7¾ H</td>
<td>20</td>
<td>30</td>
<td>2</td>
</tr>
</tbody>
</table>

REPRESENTED BY:

TIME AND FREQUENCY TECHNOLOGY, INC.
3000 Olcott Street, Santa Clara, California 95051 (408) 246-6365
**SYSTEM**

Specification

**Baseband Frequency Response**
- Program Audio: Composed of 0.0 Hz to 75 kHz
- Monoaural: 0.0 Hz to 15 kHz
- Composite: 0.0 Hz to 22 kHz
- Monaural: 39 to 67 kHz

**Harmonic and Inter-modulation Distortion**
- Composite: 0.2% from 0.0 Hz to 15 kHz; 0.3% from 30 Hz to 15 kHz
- Monoaural: 0.2% from 30 Hz to 15 kHz

**Signal-to-Noise Ratio**
- Greater than 70 dB below 100% modulation (±75 kHz RF carrier deviation and ±75 kHz channel deviation and with 75 µS de-emphasized left and right channel)

**Modulation Capability (deviation for 100% modulation)**
- Program Channel: ±75 kHz
- Multiplex Channel 1: ±6 kHz
- Multiplex Channel 2: ±6 kHz

**RECEIVER**

**RF Input Connector**
- 50 ohm, Type "N" Female

**Sensitivity**
- Composite Models: 60 µV for 60 dB SNR, de-emphasized
- Monoaural Models: 20 µV for 60 dB SNR, de-emphasized

**1 mV RF Input without de-emphasis**
- Composite Models: 60 dB Min. (75 kHz BW) Monoaural Models: 65 dB Min. (15 kHz BW)

**1 mV input with 75 µsec de-emphasis**
- Composite Models: 800 µV for 70 dB SNR with de-emphasis
- Monoaural Models: 400 µV for 70 dB SNR with de-emphasis

**Selectivity**
- (3 dB Bandwidth)
  - Composite Models: 330 kHz Min.
  - Monoaural Models: 170 kHz Min.

**Selectivity**
- (60 dB Bandwidth)
  - Composite Models: 2.4 MHz Max.
  - Monoaural Models: 1.4 MHz Max.

**Baseband Response**
- Composite Models: +10 dBm (2.4V RMS) into 600 ohms balanced, +4 dBm (1.24V RMS) into 600 ohms unbalanced, ±50 Hz to 105 kHz

**Stereo Separation**
- Composite Models: 49 dB at 1 kHz (50 dB typical), 40 dB minimum at other audio frequencies

**Crosstalk**
- Main to Sub: Composite Models: 46 dB Min.
- Monoaural Models: 46 dB Min.

**Alarm Output**
- Relay Closure: 1 A at 24 VDC, 0.5 A at 115 VAC

**Temperature Range**
- 0°C to + 50°C

**Power Requirements**
- 120/240 VAC, 50–120 Hz

**Dimensions**
- 3.25" (83 cm) H x 18" (63 cm) W x 15.5" (394 cm) D

**Weight**
- 11 lbs (5 kg) net, 15 lbs (6.8 kg) shipping

**THE STL PERFORMANCE LEADER**

**TRANSMITTER**

**RF Power Output**
- Max: 10–12 watts 600–960 MHz

**Output Connector**
- 50 ohm, Type "N" Female

**Frequency Stability**
- 1 ppm/yr

**Frequency Accuracy**
- ±0°C to ± 50°C, ±0.0001%

**Spurious Signal Suppression**
- Harmonically and Non-harmonically Related: 65 dB

**Modulation Input Levels**
- Composite: 124Vvms into 10 K ohms
- Monoaural: 124Vvms into 10 K ohms
- 0 or ±10 dBm (2.4V RMS) into 600 ohms balanced
- Multiplier: 0.53Vvms into 10 K ohms

**AC Line Power**
- 70 watts, (120/240 VAC, 50, 60 Hz)

**Operating Temperature Range**
- 0°C to +50°C

**Dimensions**
- 6.25" (13.3 cm) H X 19" (48.3 cm) W x 13" (33 cm) D

**Weight**
- 29 lbs (13 kg) net, 34 lbs (15.3 kg) shipping

**THE STL SERIES**

**7700B SERIES**

**Aural STL System**
THE TRANSMITTER

The rugged TFT 7700B Series transmitter represents an innovative approach to STL transmitter design, providing a vast improvement in S/N ratio, frequency stability, and audio performance.

FEATURES

- **IF Modulation**—The transmitter's modulation is applied to an IF frequency to achieve excellent signal-to-noise ratio and stereo performance. The final carrier frequency is obtained by heterodyning the carrier frequency against a stable frequency source and the carrier is then phase-locked to the IF.
- **Fully protected**—The output is fully protected against open and short circuits as well as high VSWR.
- **Excellent Frequency Stability**—Frequency synthesized carrier provides frequency stability of ±1 ppm/year as well as making it easier to change operating frequencies in the field.
- **Accommodates Multiple Subcarriers**—Two FM subcarriers can be inserted in addition to the main and stereo channels for SCA broadcast. One more can be added for remote control or order wire for non-broadcast use.
- **No Subcarrier Beats**—19 kHz harmonically related frequencies are chosen for use as subcarriers to eliminate intermodulation products in the baseband.

APPLICATIONS

The broadband characteristics of the TFT 7700B Series STL Systems allow for many specialized applications beyond the standard aural studio-transmitter link for a composite stereo baseband signal. Among these are:

- **Intercity Relay Systems**—By linking a number of STL transmitters and receivers in series, broadcast quality audio links between cities may be achieved, providing high quality stereo or multi-channel audio service to each city.
- **Remote Control**—With the addition of an FM subcarrier, the 7700B series STL can carry remote control signals from the studio to the transmitter site.
- **Multi-channel Audio**—Up to 4 channels of high quality radio programs or a mixture of audio and data can be transmitted via the 7700B Series STL by using FM Subcarriers and/or direct-to-line multiplex baseband equipment.
- **Stereo Decoder and AM Stereo**—An optional built-in stereo decoder and AM Stereo can be installed in the 7700B Receiver to provide L and R channel outputs for monitoring purposes or AM stereo program transmission when the transmitter is used in conjunction with a standard FM stereo generator.

FACTORY ASSISTANCE

Application Engineering and STL Application Guides for equipment selection and path calculations are available upon request.

7700B SERIES

Aural STL System

THE RECEIVER

The design of the TFT 7700B Series receiver incorporates several unique features that provide low noise, high gain and overall quality. All receivers allow for automatic changeover to hot standby in the event of a detected malfunction.

FEATURES

- **Crystal Controlled Triple Conversion Superhetronyde Design**—Provides excellent SINR and frequency stability.
- **Low Noise RF Amplifier**—A high gain and wide dynamic range RF front end provides an S/N figure.
- **Pulse-counting Discriminator**—A unique pulse-counting discriminator circuit provides ultra-linear FM demodulation to achieve low harmonic and intermodulation distortion.
- **Remote Operation and Status Check**—The receiver can be interrogated by existing remote control equipment to determine receiver performance over status. Receiver switching can also be activated by remote command when it is used in conjunction with the Model 7773, Receiver change-over unit.

ACCESSORIES AND OPTIONS

Model 7770 Transmitter Automatic Changeover: A 1½ rack mount unit which monitors critical parameters in the transmitter. If a malfunction occurs in the transmitter, it automatically switches to the hot standby transmitter. Changeover can also be accomplished by a front panel switch or a pair of relay contacts in the remote control equipment. The unit is self-powered and has a built-in coaxial relay rated at 1 KW.

Model 7773 Receiver Automatic Changeover: Similar to the Model 7770, Model 7773 monitors critical parameters in the receiver. The unit switches the program channel output as well as both subcarrier outputs.

Stereo Decoder (Option 15): Plug-in FM stereo board for decoding left and right channels. (For external audio monitoring or providing L and R channels for AM stereo broadcast.)

Frequency Division Multiplex (FDM) Baseband Encoder and Decoder: Multiple broadcast programs can be transmitted with full audio bandwidth by using optional FDM encoders and decoders. Please consult the factory.

Electronic Industries, Inc.

3080 Oakmead Village Drive P.O. Box 58088 Santa Clara, CA 95052-8088

Toll (800) 727-7272 Fax (800) 727-0424 TX (408) 741-338-0684
The Model 850 BTSC TV Stereo Aural Modulation Monitor is specifically engineered to monitor and measure performance characteristics of the BTSC stereo system. It is also designed to monitor and measure performance of the Multichannel Television Sound (MTS) Recommended Practices.

This 850's monitoring capabilities include: Total Modulation, Stereo Channel modulation, left and right audio channel modulation and Peak modulation of the Texas, Stereo, and Pilot Channels. Aural RF level can also be monitored as an on-screen parameter.

More than 20 different parameters may be monitored with the companion Model 850A in a dedicated Aural Analysis Monitor (see below).

Modulation Levels are easily read on two analog meters with quasi-peak bars. Additionally, one-per-second Peak Factors are included. A remote Null & Aural Panel is available separately.

The on-screen 850S offers these important benefits for the TV engineer:

- Perform a complete "Proof" of the entire Dallas and Stereo Channels from the studio through the over-air antenna - including the critical transmission RF stages (see table).
- Because the 850S is dependent on video instrumentation for its full BTSC monitoring and measurement capabilities, there is no requirement to "share" important video test equipment.

The operator-friendly meters and peak factors may be scaled according to specifications, useful options, see Accessories & Options).

The BTSC, when equipped with the 850S plug-in, is only half the cost of a compression system which cannot perform the BTSC full-range of critical functions.

TFT, Inc. has been designing and manufacturing Aural Modulation monitors for more than 10 years and has sold over 100 units. The popular 701-702 monitors are at the forefront standard for most TV broadcasters because of their accuracy, versatility and reliability. The new Model 850BTSC/M model has the same proven performance.

Participation on the BTSC Systems Committee ensures that all factors crucial to monitoring the BTSC audio signal are included in the design of the Model 850.

**RULES FOR AURAL RF LEVEL**

- Reference level is ±73 dB relative to zero RF level.

**OUTPUTS**

- LEFT-SIDE MAIN CHANNEL
- CENTER MODULATION
- TELEMETRY MODE 1 & 2

**COMPUTER OUTPUTS**

- CENTER MODULATION:
  - Computer output level to TPT/TFP.OUT is adjustable. (see table).
  - Computer input level to TPT/TFP.IN is adjustable. (see table).

**REMOTE INSTRUMENT PANEL**

- MAIN PANEL:
  - Basic function keys for operation. TPT/TFP 700-4000 kHz

**FUNCTION OUTPUT**

- LEVEL TO MONITOR: 0.25µV

**MODULATION and CARRIER ALARM**

- Alarm condition persists for external alarm (requires optional external Schmidt alarm)

**COMMENTS**

- RF input (except Model 850):
  - 0.25µV = 1 kHz deviation

**Left Meter Functions**

- Linearity: ±1.5% or ±3 kHz deviation

**Right Meter Functions**

- Linearity: ±1.5% or ±3 kHz deviation

**Measurement Capabilities**

- (With Distortion Analyzer/AC Level Meter, TPT/TFP 4120 equivalent)

**TOTAL MODULATION**

- Stereo Channel: 85.5% ± 3% deviation
- Left Channel: 85.5% ± 3% deviation
- Right Channel: 85.5% ± 3% deviation

**Signal Noise Ratio**

- Only 10 µV for 850 (as compared to 850S at 850µV)

**Physical Specifications**

- Weight: 6 lbs. (2.7 kg) with plug-in panel
- Shipping Weight: 30 lbs. (13.6 kg) with plug-in panel.
UHF RPU System

FEATURES

- Frequency Agile Transmitter and Receiver
- Selectable FM Deviation
- Selectable Receiver Bandwidth
- 25 watts RF Power; 2 other ranges from 0 to 18 watts
- DTMF Signaling for System Security and Cueing Command
- Front Panel Diagnostics Metering
- Transmitter Portable or Rack Mount

GENERAL DESCRIPTION

The TFT Model 8888 RPU Transmitter and 8889 RPU Receiver bring new levels of performance and convenience to Remote Pickup equipment for remote broadcast. Frequency agility, selectable FM deviation, selectable receiver bandwidth for applications in the N1, N2 and S frequency bands, and DTMF control are among the advances that TFT has brought to RPU for high quality audio performance and convenience.

MODEL 8888 RPU TRANSMITTER

The TFT 8888 frequency-agile RPU Transmitter is a compact portable or rack mountable unit (with optional adapter). It incorporates designs that enable flexible applications and high quality audio performance. U.S. Patent No. 4,710,970 has been granted to the transmitter design.
**FREQUENCY AGILE**

The TFT RPU Transmitter is frequency-synthesized for maximum versatility. Two operating frequencies are programmed by means of internal DIP switches. (See specifications for details.) The frequencies must be within 6 MHz of each other and each is programmable within a 1 MHz bandwidth in steps of 2.5 kHz. A front panel switch permits convenient selection of two user-programmed channels.

**SELECTABLE FM DEVIATION**

Hand-in-hand with frequency agility is selectable carrier frequency deviation to conform with occupied bandwidth limits in the FCC designated N1, N2 and S frequency bands. Maximum FM deviations of the 8888 in these bands are ±5 kHz, ±10 kHz, and ±25 kHz, respectively.

**HIGH POWER**

To ensure adequate fade margin and maximum distance, nominal RF power is 25 watts (+44 dBm) with medium and low power ranges of 6-18 watts and 8 watts maximum respectively.

**THREE AUDIO INPUTS**

Three microphone/line level selectable inputs minimize the need for an external mixer. Built-in peak limiting circuit prevents overmodulation without introducing harmonic distortion. A headphone output with volume control is provided for local monitoring of the mixed audio signal.

**EXTERNAL PROCESSOR PATCHING**

Audio companding or sophisticated signal processing can be used with the 8888 RPU system. The Transmitter incorporates patching facilities on the rear panel to route the mixed audio signal through an external processor.

**COMPREHENSIVE FRONT PANEL DIAGNOSTICS**

A multi-position switch and test meter allow monitoring of critical circuit parameters. An audio bargraph display is provided to continuously monitor the modulation level.

**FAULT INDICATORS**

An Antenna Fault indicator and warning buzzer on the transmitter alert the operator of potential antenna or interconnect problems. A wrong polarity indicator and warning buzzer alert the operator of incorrect battery polarity.

**BUILT-IN TEST TONE**

A built-in 400 Hz test oscillator can be activated by a front panel switch for aligning the path as well as for calibrating the modulation meter for 100% modulation.

**ACCESSORIES**

An Optional Rack Mount (Part No. 2001-2937) allows you to install two transmitters side-by-side for stereo or redundant mono applications. The mount occupies three standard EIA rack units.
MODEL 8889 RPU RECEIVER

The TFT Model 8889 is a microprocessor-controlled, frequency synthesized triple conversion receiver. As a companion to the Model 8888 RPU Transmitter, it is suited for use at repeater sites as well as at the studio.

MICROPROCESSOR CONTROL AFFORDS FULL SECURITY

An on-board microprocessor is the nerve center of the receiver. After receiving the DTMF user input (security code and commands) via the RF or telco path, or via the front panel control, it switches the operating channels and IF bandwidth. Unauthorized interruptions of the system are thereby negated.

SELECTABLE BANDWIDTH

The TFT 8889 features 3 front panel or DTMF controlled selectable IF bandwidths for 25 kHz, 50 kHz, or 100 kHz spacing, allowing for maximum flexibility of audio quality and availability of RF spectrum.

REPEATER TRANSMITTER ENABLE

A rear panel contact closure is provided to activate a repeater transmitter upon the recognition of a security code via the DTMF signaling and when the received RF signal is above the selected squelch threshold.

RECEIVED SIGNAL STRENGTH INDICATION (RSSI)

A calibrated DC voltage at the rear panel is available for RSSI for use in conjunction with remote control equipment.

BUILT-IN DTMF SYSTEM

User convenience is greatly enhanced by being able to control the receiver from a remote location via DTMF signals.

Using a standard touch-tone telephone plugged into the modular phone jack on the front panel of the RPU Transmitter, the Receiver's channel and IF bandwidth can be remotely selected by entering a unique 6-digit code. Furthermore, the DTMF codes can activate a repeater transmitter. Multiple repeaters can be individually addressed.

The DTMF tone protocol is 8 digits long. In addition to start and stop, 4 digits are a user-definable security code; the remaining 2 digits are the pre-defined execution codes.

ALTERNATE CONTROL INPUT

In case DTMF tones are unavailable from the RF path, an alternate DTMF input is provided via a rear panel phone jack. This input takes priority over the RF path.
TRANSMITTER

Frequency Range ............... 400–470 MHz, Two MHz frequencies within 6 MHz of each other.
RF Channels ................. Two pre-programmed carrier frequencies are front panel selectable. The frequencies can be located up to 6 MHz apart and each carrier is programmable within its 1 MHz bandwidth in 2.5 kHz steps by internal DIP switches.
Power Output ............... High level 25 watts nominal; mid-range 6–18 watts; low range 0–8 watts; normal reduction with 13.8V external battery. (50 ohms, type N female connector)
Maximum Frequency Deviation .... ± 5 kHz, ± 10 kHz, and ± 25 kHz
Signal-to-Noise Ratio ......... 65 dB with microphone input at ± 25 kHz deviation
Frequency Stability ......... ± 0.00025% (0° to 50°C)
VSWR .................. Withstands infinite VSWR
Spurious Output ............. 80 dB below carrier
Harmonic & Intermodulation ........... 80 dB below RF carrier

Audio inputs ................. Three microphone inputs at –70 dBm to –40 dBm, 150–500 ohms balanced, XLR-3 connector and transformer coupled input, level control provided. Switchable to high level line inputs. –20 dBm to +10 dBm, 600 ohms balanced.
Audio Frequency Response (1 dB rolloff) ......... 50 Hz to 16 kHz, for ±25 kHz deviation. 50 Hz to 10 kHz, for ±10 kHz deviation. 50 Hz to 6 kHz, for ±5 kHz deviation.
External Audio ................ Rear panel connectors for external unity gain companding or processing; input level 30K, 2V RMS; output level 1V RMS, 600 ohm balanced, XLR connectors.
Peak Modulation Limiter ............... Built-in peak modulation limiter to prevent over-deviation.
Front Panel Bargraph ............... Monitors modulation level
Power Requirements .......... 115 Vac, 60 Hz, 100 watts or 13.8V dc external battery; 7 amps; switchable. 230 Vac, 50 Hz optional.
Size .................. 1/2 rack mount: 5 1/4" (13.3 cm) H x 8 1/2" (21.6 cm)W x 14 1/2" (36.8 cm)D
Weight .................. 14.5 lbs net (6.7 kg); shipping wt: 18 lbs (8.3 kg)
FCC ID .................. B09CJ8888RPU

RECEIVER

Frequency Range ............... 400–470 MHz.
RF Channels ................. Two pre-programmed carrier frequencies are front panel selectable. Two carrier frequencies can be located up to 6 MHz apart and each carrier is programmable within its 1 MHz bandwidth in 2.5 kHz steps by internal DIP switches.
RF Input .................. 10 uV for 20 dB quieting ±5 kHz deviation de-emphasized audio. 50 uV for 50 dB. (Type N female connector, 50 ohms.)
IF and Image Rejection ............. 80 dB
Frequency Stability ......... ± 0.00025% (0°–50°C)
Spurious Rejection ......... 70 dB
Audio Response (400 Hz reference) . IF B.W. … –1 dB … –3 dB
Narrow 40 Hz to 6 kHz 30 Hz to 7 kHz
Medium 40 Hz to 8 kHz 30 Hz to 10 kHz
Wide 40 Hz to 12 kHz 30 Hz to 15 kHz
Program Audio Output ............. +10 dBm, 600 ohm balanced, with squelch, barrier strip.

Front Panel Meter ............... Monitors received signal strength, program audio level, power supply, VCO voltages.
DTMF Decoder .......... Allows remote control of receiver band-width, channel frequency selection, and repeater transmitter enable.
External DTMF .......... Overrides input DTMF signal from air link. Phone jack connector
Received Signal Strength ............. 1 VDC to 5 VDC for 1 uV to 200 uV of RF
Transmitter Enable .......... Relay contact closure enables external repeater transmitter
Security Code ............... User programmable 4-digit security code, set by internal DIP switches.
AC Power .................. 115/230 Vac, 60/50 Hz, 30 watts.
Optional Battery Power ............. 12 to 13.8 Vdc, approx 2 amps
Operating Temperature .......... 0°C to 50°C
Size .................. 3 3/4" (8.9 cm)H X 19" (48.3 cm)W X 11" (27.9 cm)D
Weight .................. 10 1/2 lbs (4.8 kg); shipping wt: 13 lbs (6.0 kg)

Receiver Bandwidth, SNR, THD, and Adjacent Channel Rejection

<table>
<thead>
<tr>
<th>Channel Spacing (FCC Description)</th>
<th>F</th>
<th>IF BW</th>
<th>THD (400 Hz)</th>
<th>S/N (De-emp)</th>
<th>Adj. Ch Rej</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 kHz (25K0F3)</td>
<td>± 5 kHz</td>
<td>Narrow</td>
<td>&lt;2.0%</td>
<td>&gt;55 dB</td>
<td>50 dB</td>
</tr>
<tr>
<td>25 kHz (25K0F3)</td>
<td>± 5 kHz</td>
<td>Medium</td>
<td>&lt;1.0%</td>
<td>&gt;55 dB</td>
<td>6 dB</td>
</tr>
<tr>
<td>25 kHz (25K0F3)</td>
<td>± 5 kHz</td>
<td>Wide</td>
<td>&lt;0.5%</td>
<td>&gt;55 dB</td>
<td>0 dB</td>
</tr>
<tr>
<td>50 kHz (50K0F3)</td>
<td>± 10 kHz</td>
<td>Medium</td>
<td>&lt;2.0%</td>
<td>&gt;60 dB</td>
<td>55 dB</td>
</tr>
<tr>
<td>50 kHz (50K0F3)</td>
<td>± 10 kHz</td>
<td>Wide</td>
<td>&lt;1.0%</td>
<td>&gt;60 dB</td>
<td>6 dB</td>
</tr>
<tr>
<td>100 kHz (100K0F3)</td>
<td>± 25 kHz</td>
<td>Wide</td>
<td>&lt;1.0%</td>
<td>&gt;68 dB</td>
<td>26 dB</td>
</tr>
</tbody>
</table>

Contents subject to change without notice

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Santa Clara, California 95052-8088
TFT INC
(408) 727-7272
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FAX: 408-727-5942
**FEATURES**

- Frequency Synthesized AM or FM Receivers
- LED Display of Days Since Last Transmission & Last Reception
- Programmable Encoding and Decoding Tone
- L and R or Composite Signal Loop-Through
- FCC Certified

**GENERAL DESCRIPTION**

The Models 886 and 887 Emergency Broadcast System (EBS) receivers are designed for broadcasters to meet Parts 73.940, 73.941 and 73.942 of the FCC Rules and Regulations.

The AM receiver, Model 886, is tunable across the AM broadcast band, using a frequency synthesized local oscillator. Tuning is accomplished with a 3-digit, front-panel push-button switch in 10 kHz increments. The stability of the receiver is that of the crystal oscillator, ± 500 Hz per year.

The FM receiver, Model 887, is a high-performance, digitally tunable receiver, using a 4-digit front-panel push-button switch in 100 kHz increments. The Model 887 is ideally suited to FM intercity relay networks, key links in the EBS alerting procedure, allowing pickup and rebroadcast of emergency programming without degradation of signal quality.

Both receivers have built-in two-tone decoders for the 853 Hz and 960 Hz EBS signaling tones from demodulated audio outputs. Stable piezoelectric tuning fork filters are used to achieve a bandwidth of ± 5 Hz from each tone frequency. The receiver squelch is controlled by a programmable delay circuit in 2, 4 or 8 seconds after receipt of the two-tone attention signal.

There are separate 2-digit LED displays on the front panels. They show the number of days, up to twelve, since EBS test transmissions were last received and/or sent. On the 12th day, the displays start flashing. This assists in avoiding FCC citations for incorrect use or non-use of the EBS system. Bargraphs are provided on the front panel for both audio level and RF signal strength observations. A front panel loudspeaker is standard in each receiver for audio monitoring, with its volume control located on the rear panel.

The integral two-tone EBS Generator, using crystal oscillators, produces the 853 Hz and 960 Hz tones simultaneously, with an accuracy of ± 0.25 Hz. The duration of the two-tone signal is also programmable by internal DIP switches in 6, 12 or 24 second intervals. Tone amplitudes may be observed and adjusted individually. Test and on-air transmission switches are provided on the front panels of each receiver. Stereo and composite signal loop-through are provided on the rear panel. Remote activation and reset are available via opto-isolators.
### Common Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decoder Bandwidth</td>
<td>± 5 Hz</td>
</tr>
<tr>
<td>Generator Output Level</td>
<td>+8 dBm nominal</td>
</tr>
<tr>
<td>Encoder Frequency Stability</td>
<td>± 0.25 Hz, crystal controlled</td>
</tr>
<tr>
<td>Audio Output Level</td>
<td>250 mw, internal loudspeaker</td>
</tr>
<tr>
<td>Output Impedance</td>
<td>600 ohms, balanced</td>
</tr>
<tr>
<td>Harmonic Distortion</td>
<td>Less than 2%</td>
</tr>
<tr>
<td>Tone Duration</td>
<td>6, 12 or 24 seconds, programmable</td>
</tr>
<tr>
<td>Tone Level Adjust</td>
<td>Internal</td>
</tr>
<tr>
<td>Remote Activation and Reset</td>
<td>Opto isolators via rear panel strip</td>
</tr>
<tr>
<td>Time Delay for De-muting</td>
<td>Programmable, 2, 4 or 8 seconds</td>
</tr>
<tr>
<td>Audio Loop-through</td>
<td>Balanced: L and R channel</td>
</tr>
<tr>
<td>Loss of Carrier Alarm</td>
<td>Transistor collector active pull up to 10 V, 10 ma</td>
</tr>
<tr>
<td>Received Signal Strength Indicator (RSSI)</td>
<td>5-element LED bargraph</td>
</tr>
<tr>
<td>Receiver Audio Level Indicator</td>
<td>5-element LED bargraph</td>
</tr>
<tr>
<td>Receiver Audio Outputs (600 ohm)</td>
<td>Balanced: +8 dBm Unbalanced: 1 Vrms</td>
</tr>
<tr>
<td>External Alarm</td>
<td>SPDT relay contacts to rear panel strip after receipt of alert.</td>
</tr>
<tr>
<td>Receiver a.c. Power</td>
<td>115 v.a.c. ±15%, 50/60 Hz, 20 watts maximum</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>0° to 50° C</td>
</tr>
<tr>
<td>Size</td>
<td>1½&quot; high, 19&quot; wide, 10&quot; deep</td>
</tr>
<tr>
<td>Weight</td>
<td>6 lbs (2.7 kg); 10 lbs (4.5 kg) shipping</td>
</tr>
</tbody>
</table>

### Front Panel Description

- **Day Display**: Two digital displays to record number of days since last transmission or reception of two-tone transmission. Flashes after 12 days.
- **ON/STAND-BY Switch**: Two-position toggle switch. In ON mode, the loudspeaker is muted. In STAND-BY mode, the loudspeaker is muted until an EBS alert is received.
- **TEST/RESET Switch**: Three-position, spring-loaded toggle switch initiates EBS transmission in Test position and interrupts in Reset position.

### ON AIR Switch

Two, three-position spring-loaded toggle switches. Must be held in opposing positions to prevent accidental activation.

### 853 Hz OPERATE/960 Hz Switch

Three-position, spring-loaded toggle switch. Tests individual tones and connects both tones to output for test purposes.

### Model 886 AM Receiver

- **Frequency Range**: 540 kHz to 1720 kHz
- **Local Oscillator Stability**: ± 500 Hz per year
- **Tuning Method**: Push-button stepswitch in 10 kHz increments
- **Antenna Input**: 75 ohms nominal, unbalanced
- **Sensitivity**: 30 uV for 20 dB S/N at 30% modulation
- **AGC**: 55 dB
- **IF Bandwidth, 6 dB**: ± 5 kHz
- **Harmonic Distortion**: Less than 3% at 50% modulation with 10 mV/meter RF signal level
- **Noise**: 45 dB or greater below 90% modulation with 10 mV/meter RF signal level

### Model 887 FM Receiver

- **Frequency Range**: 88 MHz to 108 MHz
- **Tuning Method**: Push-button stepswitch in 100 kHz increments
- **Antenna Input**: 75 ohms nominal, unbalanced
- **Sensitivity**: 2 uV for 20 dB quieting
- **AGC**: 60 dB
- **Audio Frequency Response**: ± 1 dB, 50 Hz to 75 kHz
- **Harmonic Distortion**: 1% at 33% modulation
- **S/N Ratio**: 60 dB or greater below 100% modulation at 50 uV RF input
- **De-emphasis**: 75 usec

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**Encoder/Decoder FCC ID Number:** B10886 (AM); B10887 (FM)
### TFT REMOTE CONTROL ACCESSORIES

**MODEL FSU-01: FAILSAFE UNIT**

Designed primarily for television applications, Model FSU-01 monitors four critical parameters required by the FCC. These include: Aural transmitter plate voltage, plate current, aural power output and visual transmitter power output. A fifth input is also provided to monitor the telemetry failure signal from the remote control equipment Model 7601R. Any failure occurring in one of these five monitored functions will activate the one-hour timer. Two separate sets of relay contact closures are provided; one to turn off the transmitter by opening the relay contact closures one hour after activation of the timer, and one to provide contact closures when OVERRIDE switch on the front panel is energized. In addition, a status output of logic level “zero” is available to alert the operator upon the activation of the one-hour timer. Either 6 seconds or 60 seconds delay can be programmed into the status indication. The FSU-01 is a 3½” rackmount unit, 10” deep. Power requirements are 115/230 VAC 50-60 Hz.

**MODEL CSA-01: CHOPPER-STABILIZED AMPLIFIER**

Chopper-stabilized, solid state DC amplifier samples sensitive DC meter circuits and without effecting normal meter readings. Floating input allows sampling of positive, negative or isolated circuits. Source circuit may be up to 350 volts above ground potential. An output of 1.5 VDC is produced from 15 microamps flowing through the 2200 ohm input termination resistor. Gain and offset controls are also provided. The temperature range for stabilized operation of CSA-01 is 0° to 50°C. Power requirements are 115/230 VAC, 50-60 Hz.

**MODEL PLC-01: POWER TO LINEAR CONVERTER**

The PLC-01 accepts a low-level DC current sample from the reflectometer representing the power output of the broadcast transmitter and amplifies it to the required level suitable for driving remote control and logging equipment. Logarithmic and linear outputs are provided by the PLC-01. The logarithmic output provides a linear voltage with respect to transmitter power, therefore the power of the transmitter can be indicated by a linear meter scale. Operating temperature range is 0° to 50°C. Power requirements are 115/230 VAC, 50-60 Hz.

**MODEL TLK-01: TOWER LIGHT KIT**

The TLK-01 is designed to sample AC line current, including tower lights or deicers. A current transformer allows sampling over a wide current range. The incorporation of the current transformer makes it unnecessary to establish physical connection with the circuit being sampled.

**MODEL PVK-01: PLATE VOLTAGE KIT**

This kit will sample plate voltages from 1,000 VDC to 20,000 VDC. A well-insulated resistor network assures accuracy and continued reliability.

**MODEL LVK-01: LINE VOLTAGE KIT**

The LVK-01 observes AC line voltages or other AC circuits. AC voltages from 6.3 VAC to 440 VAC may be sampled.

**MODEL MBB-01: UNIVERSAL PLATE CURRENT KIT**

Either plate current or plate voltage may be sampled with the MBB-01. It is widely used in cases where neither side of a circuit is at ground potential or where positive ground is employed. The unit is designed to operate at ±15% of normal plate voltage or current and will withstand peak voltages up to 10,000 VDC above ground potential. External shunt or series resistance is required.

**MODEL TSK-01: TEMPERATURE SENSING KIT**

Senses air temperatures from -20° to 60°C. Provides a linear reading of temperature with no conversion table or graph required when read on an appropriate meter scale. Self-contained power supply provides operation from 115/230 VAC 50-60 Hz power source.

**MODEL ADS-01: ALTERNATE DATA PATH SELECTOR**

The ADS-01 monitors the output of the Double-Scan-Comparison circuitry in the Model 7610C and 7610R data modems. Should there be consecutive invalid data output, the ADS-01 will automatically switch from the primary data path to an alternate data path such as a standby phone line. This allows the remote control equipment to remain in operation should there be a failure in the primary data link. One each of the ADS-01 is required to equip the Control Terminal and the Remote Terminal. The ADS-01 is a 1½” rackmount unit. Power requirements are 115/230 VAC 50-60 Hz.
DIGITAL CONTROL/TELEMETRY SYSTEM

FEATURES:
- Fully digital, pulse code modulated FSK modems
- Interconnected by telephone wire line or STL and SCA
- One man calibration
- 10 channels of RAISE/LOWER and TELEMETRY functions
- Quick-disconnect barrier-strip boards for easy field service
- Complete digital system for under $2000

DESCRIPTION:
The new TFT Model 7601 now makes it possible for any broadcast station with a minimum budget to enjoy the accuracy and reliability of full DIGITAL remote control system - eliminating guess-work and reducing operator error.

Choice of Transmission Methods
With the 7601, interconnection can be via telephone line(s) or radio links which include STL and SCA. Pulse Code Modulation (PCM) is used for data transmission, with built-in digital data modems.

Maximum Data Integrity
Data accuracy and greatly reduced operator errors are assured by TFT-proprietary digital data filtering and closed-loop automatic verification systems. In digital data filtering, each control command is sent twice. The two are then compared at the remote point, bit by bit. Only if they match exactly are the commands carried out.

Minimal Service Downtime
The advanced, solid state design of 7601 components ensures dependable, long-life operation. In addition, the remote units at the transmitter have rear panel quick-disconnect barrier strip boards that can be removed by simply loosening four thumbscres - a TFT exclusive. This allows you to remove the unit from the rack in the event service may be required, without disconnecting any of the wiring between the remote control unit and the transmitter or alarm sampling points. If service is needed on a 7601, a standby unit can quickly be installed to keep you operating.

One-Man Calibration
The front panel of the Model 7601R has a DVM and scaling potentiometers so that just one man on site can calibrate the system. For such local operations, a switch on the remote unit locks out the studio and overrides the telemetry and control fail-safes.

Model 7601 remote unit with lock-out switch to override studio functions.

For ordering information and technical specifications refer to Model 7600 data sheet.
## REMOTE CONTROL USER'S LIST

<table>
<thead>
<tr>
<th>ARKANSAS</th>
<th>MASSACHUSETTS</th>
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**9-20-77**
INTRODUCING:

TELESCAN™

TFT'S COMPUTERIZED NERVE CENTER FOR MONITORING AND LOGGING UP TO 110 REMOTE FUNCTIONS

- CRT display allows simultaneous monitoring of up to 30 channels per page.
- Custom computer program brackets critical status limits and alerts operator when limits are exceeded.
- Automatic logging system provides both periodic and on-command print-outs of selected parameters.
- Standard typewriter keyboard allows operator annotations to log outputs.
- Multi-site operation capacity built-in.
- Compatible with Model 7600 Digital Remote Control equipment or as independent system.

DESCRIPTION
The TFT Model 7640 TELESCAN is a computer assisted option for the Model 7600 Remote Control System. It can also be used to assist the operation of any remote control equipment or used as an independent system in data acquisition, status monitoring and logging. Both telemetry and ON/OFF status functions for up to 110 channels can be clearly displayed, on command, on the 12 inch CRT. Up to 30 control channels may be called up simultaneously via the keyboard on the CRT unit. TELESCAN is far more than a passive display system. A built-in microprocessor and special software package allow you to pre-program two sets of upper and lower limits of the parameter being monitored, so that central control can be instantly alerted when these parameters are exceeded. The additional feature of automatic or call-up logging provides a permanent record. The TELESCAN System consists of four major components, Remote Scanner, CPU, Video Display and Printing Terminal.

REMOTE SCANNER
Model 7640R is a remotely located unit which continuously scans the data inputs from various sensors, such as temperature, power, voltages, currents and contact closures. It converts dc signals to digital data and transmits the data to the CPU via built-in FSK modems by means of phone line or audio link at a rate of 15 channels per second.

CENTRAL PROCESSING UNIT (CPU)
A microprocessor based CPU provides direct interaction with the computer programs and tolerance limits stored in the non-volatile memories. It processes the telemetry data consisting of channel identification and meter readings via the FSK modem. A built-in alerting feature will cause the appropriate video display to flash on and off when any pre-programmed limits have been exceeded. In addition to the information storage and processing capabilities, the CPU also provides a Julian Time Clock which consists of calendar and time information for display and logging purposes.

VIDEO DISPLAY
A 12-inch CRT screen can display as many as 25 characters per channel for 30 telemetry or status channels simultaneously. These displays are presented in page-type format with 80 character column widths. Any combination of status channels from any remote location may be called up via a standard typewriter keyboard at the central location. This same keyboard may also be used for inputs and to annotate printed material from the logging system. Additional displays can be connected in parallel with the main CRT.

AUTOMATIC LOGGING
A data printing terminal is standard equipment on the TELESCAN. This terminal will provide automatic periodic print-outs of selected telemetry information on a pre-scheduled basis or give instant hard copy output on separate command. Up to 20 columns of data can be printed on the character printer. Typewriter keyboard also comes as standard equipment for annotation purposes.

SOFTWARE
A standard software package is provided with each TELESCAN for basic interface functions normally required. However, customized software programs can also be added at any time to satisfy specific requirements of the user.
### PRICE SCHEDULE
REMOTE CONTROL EQUIPMENT (CON’T)

<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>7610</td>
<td>Extender Cable Kit for 7610R</td>
<td>A cable kit to provide rear panel wiring extension such that the 7610R can be removed from the rack for service without having to disconnect wirings to and from the transmitter and sensors.</td>
<td>$25.00</td>
</tr>
<tr>
<td>7610</td>
<td>Spare Parts Kit</td>
<td>To provide spare parts such as relays, I.C.’s and other critical components for emergency repair</td>
<td>$370.00</td>
</tr>
<tr>
<td>7615</td>
<td>Direct ON/OFF Control and Status monitoring</td>
<td>When operated in conjunction with the Model 7610, it provides 15 channels of direct ON/OFF control plus 15 channels of status indicators</td>
<td>$1,850.00*</td>
</tr>
<tr>
<td>7620R</td>
<td>Channel Expander (10 channels)</td>
<td>To expand the RAISE/LOWER and Telemetry channels of the Model 7610 from 10 each to 20 each (to be installed at the Remote Terminal only)</td>
<td>$900.00</td>
</tr>
<tr>
<td>7630R</td>
<td>Channel Expander (20 channels)</td>
<td>To expand the RAISE/LOWER and Telemetry channels of the Model 7610 from 10 each to 30 each (to be installed at the Remote Terminal only)</td>
<td>$1,350.00*</td>
</tr>
<tr>
<td>7640</td>
<td>TELESCAN SYSTEM (CPU, CRT, Printer and Scanner)</td>
<td>To provide computer option to the remote control system. Functions include multi-channel CRT data display, tolerance alarm, and logging</td>
<td>$12,000.00</td>
</tr>
<tr>
<td>7641</td>
<td>TELESCAN SYSTEM (CPU, Printer and Scanner)</td>
<td>Same as 7640 without CRT display</td>
<td>$10,500.00</td>
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### REMOTE CONTROL INTERFACING ACCESSORIES

<table>
<thead>
<tr>
<th>ACCESSORY</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSU-01</td>
<td>Fail-Safe Unit for TV application</td>
<td>To provide full compliance with FCC Rules by monitoring 4 critical parameters, aural plate voltage, aural plate current, aural power and visual power</td>
</tr>
<tr>
<td>ADS-01</td>
<td>Alternate Data Path Selector</td>
<td>Switch from SCA to phone line when invalid data is detected from either the Control or the Remote terminal. Two are required per system.</td>
</tr>
<tr>
<td>CSA-01</td>
<td>Chopper Amplifier</td>
<td>To provide isolation from a floating circuit to a grounded circuit. DC gain is also provided.</td>
</tr>
<tr>
<td>PLC-01</td>
<td>Power-to-Linear Converter</td>
<td>To linearize power readings from log scale to linear scale.</td>
</tr>
<tr>
<td>TLK-01</td>
<td>Tower Light Monitor</td>
<td>To monitor AC line current</td>
</tr>
<tr>
<td>LVK-01</td>
<td>Line Voltage Monitor</td>
<td>To monitor AC line voltage</td>
</tr>
<tr>
<td>PVK-01</td>
<td>Plate Voltage Monitor</td>
<td>To monitor plate voltage up to 20 kv</td>
</tr>
<tr>
<td>TSK-01</td>
<td>Temperature Sensing Kit</td>
<td>To monitor temperature of air or components</td>
</tr>
<tr>
<td>MBB-01</td>
<td>Isolation Amplifier (High Voltage)</td>
<td>For monitoring voltage and current at 10 kv above ground and translate reading in reference to ground voltage to suit the input of the Remote Terminals</td>
</tr>
</tbody>
</table>

**NOTE:**
1. For terms of sale and warranty, see Broadcast Monitoring Equipment Price List.
3. All prices are F.O.B. Santa Clara, California and subject to change without notice.
4. Please specify options with order.
<table>
<thead>
<tr>
<th>MODEL NO.</th>
<th>DESCRIPTION</th>
<th>APPLICATION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>X-14</td>
<td>Status and Control System having 14 ON/OFF, plus 14 status indication channels. Consisting of a Control and Remote unit.</td>
<td>For ON/OFF control and status indications only. Telemetry is not required.</td>
<td>$ 1,895.00</td>
</tr>
<tr>
<td>X-14</td>
<td>Full duplex Input and Output of 4 wire interconnection</td>
<td>Two separate pairs of wires to interconnect the control terminal and remote terminal</td>
<td>$ 75.00</td>
</tr>
<tr>
<td>X-14</td>
<td>Single set of Subcarrier Generator and Demodulator</td>
<td>To provide SCA generator and demodulator at either the control terminal or the remote terminal.</td>
<td>$ 300.00</td>
</tr>
<tr>
<td>X-14</td>
<td>Two sets of Subcarrier Generator and Demodulator</td>
<td>To provide SCA generators and demodulators at both the control terminal and remote terminal.</td>
<td>$ 600.00</td>
</tr>
<tr>
<td>714</td>
<td>Data Channel Line Multiplex consisting of two units</td>
<td>To enable X-14 to share a command phone line with other remote control equipment such as Moseley TRC-15.</td>
<td>$ 570.00</td>
</tr>
<tr>
<td>7601</td>
<td>10-channel Raise and Lower functions plus 10 channels of digital telemetry, consisting of a control terminal and a remote terminal</td>
<td>To provide economical digital remote control to AM &amp; FM stations (up to maximum 10 channels)</td>
<td>$ 1,995.00</td>
</tr>
<tr>
<td>7601</td>
<td>Sub-carrier (SCA) Detector; for FM use 67 kHz, Other frequencies from 26 kHz to 185 kHz available, Mounts within 7601 Control or Remote Terminal</td>
<td>To provide demodulation of the SCA subcarrier (specify frequency)</td>
<td>$ 150.00</td>
</tr>
<tr>
<td>7601</td>
<td>Subcarrier (SCA) Generator; for FM use 67 kHz, Other frequencies from 26 kHz to 185 kHz available, Mounts within 7601 Control or Remote Terminal</td>
<td>To generate SCA subcarrier (specify frequency)</td>
<td>$ 150.00</td>
</tr>
<tr>
<td>7601</td>
<td>Extender Cable Kit for Remote Terminal</td>
<td>To extend the rear panel connections from the rack to a work bench if service is required</td>
<td>$ 25.00</td>
</tr>
<tr>
<td>7601</td>
<td>Spare Parts Kit</td>
<td>To provide spare parts such as relays, and I.C's for emergency repair</td>
<td>$ 320.00</td>
</tr>
<tr>
<td>7610</td>
<td>10 channel RAISE/LOWER plus 10 channel Telemetry digital remote control system, Expandable by adding Model 7615, 7620, and 7630 to a 110-channel system</td>
<td>To provide digital remote control systems for medium and large size AM, FM &amp; TV stations. Also suitable for controlling multi-site operations.</td>
<td>$ 2,795.00*</td>
</tr>
<tr>
<td>7610</td>
<td>Sub-carrier (SCA) Detector; for TV application, specify 39 kHz; for FM, 67 kHz, Other frequencies 26 kHz to 185 kHz available, Mounts within 7610 Control or Remote Terminal,</td>
<td>To provide demodulation of the SCA subcarrier (specify frequency)</td>
<td>$ 150.00</td>
</tr>
<tr>
<td>7610</td>
<td>Sub-carrier (SCA) Generator; for TV use, specify 39 kHz; for FM, 67 kHz, Other frequencies 26 kHz to 185 kHz available, Mounts within 7610 Control or Remote terminal</td>
<td>To generate SCA sub-carrier (specify frequency)</td>
<td>$ 150.00</td>
</tr>
<tr>
<td>7610</td>
<td>BCD parallel data inputs (for the Remote Terminal)</td>
<td>To provide two channels of parallel BCD inputs to accept external digital data such as the readings from a digital frequency monitor or frequency counter.</td>
<td>$ 150.00</td>
</tr>
<tr>
<td>7610</td>
<td>Parallel BCD Data Output Cable Kit (for 7610C Control Terminal)</td>
<td>A cable kit to provide external control of channel selection, RAISE/LOWER function and parallel BCD output of the channel identification and DVM reading</td>
<td>$ 175.00</td>
</tr>
</tbody>
</table>
THE FIRST FULLY MODULAR

DIGITAL REMOTE CONTROL SYSTEM

THAT CAN BE EXPANDED TO FIT YOUR

GROWING AM, FM OR TV TRANSMISSION NEEDS

TIME AND FREQUENCY TECHNOLOGY, INC.
3000 OLCO ST, SANTA CLARA, CA 95051 (408) 246-6365 TWX no. 910-338-0584
FEATURES:
- Modular, field expandable design
- Fully digital, pulse code modulated FSK modems
- Linked by telephone wire line or STL and SCA
- One man calibration
- 10 to 80 channels of RAISE/LOWER AND TELEMETRY functions
- Up to 30 channels of direct ON/OFF control in addition
- Up to 30 channels of STATUS and ALARM monitoring
- Digital display of up to 30 parameters simultaneously
- Limit alarms and optional automatic logging
- Quick-disconnect barrier-strip boards for easy service of remote units
- Complete line of components for transmitter and sampling point interface

GENERAL DESCRIPTION
Start with a stand-alone, 10-channel TELEMETRY and RAISE/LOWER system that's price-competitive with less versatile analog systems. Then, if you want, add up to 70 more channels of RAISE/LOWER plus up to 30 channels of direct ON/OFF control and up to 30 channels of STATUS/ALARM monitoring. You can even add a microprocessor-controlled multi-channel data display that gives you a digital readout of 30 simultaneous meter readings. Automatic logging is also available, as is a provision for external control by a computer, an A.T.S. monitor or similar devices. All components, both at the control point and the remote point, fit in a standard 19-inch rack.

The TFT 7600 System makes it possible for any-size AM, FM and TV station to have direct, digital control of remote transmitters. Designed to meet today's needs, as well as those of future A.T.S. operations, the system is totally modular so that you can tailor it to your specific control and budget requirements.

Choice of Interconnect Methods
With the 7600 series, interconnection can be via telephone lines or radio links. Radio links include STL and SCA or TSL. Pulse Code Modulation (PCM) is used for data transmission, and the system has built-in digital data modems.

Maximum Data Integrity
Data accuracy and greatly reduced operator errors are ensured by TFT-proprietary digital data filtering and closed loop automatic verification systems. In digital data filtering, each control command is sent twice. The two are then compared at the remote point, bit by bit. Only if they match exactly are the commands carried out.

Minimal Service Downtime
The advanced, solid state design of 7600 System components ensures dependable and long-life operation. In addition, the remote units at the transmitter have rear-panel, quick-disconnect barrier-strip boards—a TFT exclusive. So, you can remove the units from the rack without disconnecting any of the wiring between the remote control system and the transmitter or alarm sampling points. If service is needed on one of the units, a standby can be quickly installed to keep you operating. If servicing of the chassis is necessary, rear panels can be removed by simply loosening four thumbscrews.

One-Man Calibration
The remote telemetry/control unit used in the 7600 System has a front panel DVM and scaling potentiometers so that one man can calibrate the system on-site. For such local operations, a switch on the remote unit locks out the studio and overrides the telemetry and control failsafes.

Multi-Site Operation
Both site and channel identification are coded in the TFT 7600 data transmission. This allows transmitters located in up to sixteen different places to be controlled from a centralized point.

SYSTEM COMPONENTS
Model 7610, Digital Control/Telemetry System
The Model 7610 is the basic building block of the versatile 7600 system. Although it is a fully stand-alone, 10 channel digital system with RAISE/LOWER functions and 10-channels of telemetry, it can be field expanded to meet...
the needs of even the largest station by merely adding additional modules.

Individual channels on the Model 7610 are selected by using a thumb-wheel switch. Once selected, the channel number is fed back to the control point and displayed on the front panel for verification. The system then addresses this channel and displays the meter reading on a front panel-mounted 3¾ digit DVM. Meter readings are updated 3 times/second.

Control commands are initiated by pushing either the RAISE/ON or the LOWER/OFF buttons on the front panel. When a command is activated at the control point, a signal is fed back from the remote point. This signal verifies receipt of the command by illuminating the active command button.

For external control, a rear panel connector on the 7610 can be enabled by a front panel switch (Option 04 cable kit required). It allows external selection of channel number and command by a computer or an A.T.S. monitor.

Model 7615, Direct On/Off Control and Status Monitoring System

Adding a Model 7615 to the Model 7610 gives you direct, ON/OFF control of up to 15 different functions, such as filament voltage, plate voltage, main power, overload reset, tower lights, and program source selection. No longer is it necessary to dial them in one-at-a-time. ON/OFF commands are initiated by front panel toggle switches.

The Model 7615 also gives you fifteen status channels, each with its own independent LED indicator. These can monitor such go/no-go functions and/or alarms as: power, voltages, temperatures, intrusion, VSWR, and tower lights. Get a complete display of status and alarms, at-a-glance. The status indicators can also be used to verify ON/OFF functions. Status outputs can be used to drive external devices and alarms.

For even more control, two Model 7615's can be used simultaneously with one Model 7610. This gives you 30 ON/OFF control channels and 30 status monitoring channels.

Model 7620/7630, Channel Expander

The Model 7620 or 7630 installed at the remote point expands the RAISE/LOWER and TELEMETRY functions of the Model 7610 from 10 to 20 or 30 channels. As many as three Model 7630's and one Model 7620 can be added to the Model 7610 to give you a total of 80 RAISE/LOWER and TELEMETRY functions.

Model 7640 Telescan System (Optional)

Finally, the Model 7640 System may be automated with the 7640 Telescan System. Up to 30 channels can be instantly accessed and monitored on the 7640 CRT located at the control point. What's more, a built-in computer system automatically brackets critical limits and instantly alerts the control point when they are exceeded. Automatic logging via a line printer provides hard copy at regular intervals or on command.

Complete specifications on Model 7640 Telescan are available on a separate data sheet.

ORDERING INFORMATION

Complete system configurations are available for both telephone link and RF link. These systems are specifically tailored for either AM, FM or TV. Your local TFT Representative or the factory will be happy to layout such a system for you.

OPTIONS

Option 01—Detector for subcarrier operation in RF link (specify frequency)
Option 02—Generator for subcarrier operation in RF link (specify frequency)
Option 03—2 Parallel input channels for 3¾ digit BCD sources.
Option 04—Data outputs and cable kit for readout from 7610C in BCD format by external command.
Option 05—Extended Cable assembly for bench servicing of Remote Units
Option 06 thru 08—Spare Parts Kits (See Price List)

TFT 7600 ACCESSORIES

A full line of accessories for telemetry and remote control are designed to interface directly into the 7600 system. These include Temperature Sensing Kit, Tower Light Kit, Fail-safe Unit and Chopper Stabilized D.C. amplifier. Complete specifications on these accessories are available on a separate data sheet.

Figure 2: Model 7620/30 Channel Expander provides up to 20 additional control and telemetry functions at the remote point.
**SPECIFICATIONS**

Data Transmission ............. Digital pulse code modulated FSK Modems
System Capacity ................. Up to 80 channels of momentary RAISE/LOWER and TELEMETRY. And 30 channels of ON/OFF direct control and STATUS/ALARM
Telemetry Accuracy ............... 0.1% of reading
Resolution ....................... one part in 1000.
Telemetry Update ................ 3 updates per second
Telemetry Input
  Input Voltage .................. ±1 VDC differential for full scale (±1000) display. Accepts 200% over-range capability with 3 VDC differential to display ±3000.
  Common mode voltage .......... ±350 VDC
  Input impedance ............... 50 k ohms
Control Output .................. Relay contact closure, isolated, AC/DC rated, 50-watt non-inductive.
Interconnect Requirements
  Telephone line .................. 2 wire unconditioned, Series 3002 Data Circuit.
  Audio channel .................. Any voice grade channel having 300 Hz to 3 kHz bandwidth
  Radio (STL) ..................... Plug-in FM subcarrier modulator and demodulator for command link.

Radio (off-air) ................. SCA frequencies or TSL
Control Fail-safe ............... Provides open relay contact closure 30 seconds after control signal fails.
Telemetry Fail-safe ............. Output for driving external one-hour timer and TV fail-safe units for full compliance with FCC Rule 73.676
Power .......................... 120/240 VAC 50-400 Hz
Operating Temperature .......... −10° to +50°C

**SIZE AND WEIGHT**

<table>
<thead>
<tr>
<th>Model</th>
<th>19” rack size</th>
<th>Depth</th>
<th>Weight in lbs.</th>
<th>Power in watts</th>
<th>No. of Units</th>
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<tbody>
<tr>
<td>7610</td>
<td>3½ H</td>
<td>13”</td>
<td>14</td>
<td>12</td>
<td>2</td>
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<tr>
<td>7615</td>
<td>3½ H</td>
<td>10½”</td>
<td>12</td>
<td>10</td>
<td>2</td>
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<td>7620/</td>
<td>5¼ H</td>
<td>13”</td>
<td>6</td>
<td>from</td>
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<tr>
<td>7630</td>
<td></td>
<td></td>
<td></td>
<td>Model 7610</td>
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**BLOCK DIAGRAM**

Represented By

**TIME AND FREQUENCY TECHNOLOGY, INC.**
3000 OLCOTT STREET, SANTA CLARA, CA 95051 (408) 246-6365 TWX No. 910-338-0584

Specifications subject to change without notice
INDEPENDENT

Remote Control and Status Monitoring System

- 15 Control/Status Channels
- Expandable to 45 Control/Status or 79 Status Only
- Full Digital Data
- Parity Check Performed on Each Data Word
- Built-in Crystal Controlled Data Modems
- Double Scan Compares Each Data Bit
- Interconnection by Land Wire or Radio
**DESCRIPTION**

The TFT Model 7815 is a remote control and status monitoring system using digital data transmission techniques. It is intended for the remote control and monitoring of electrical apparatus including broadcast transmitters via a 3 kHz communications link. The system consists of two compact units; one for the control point and one for the remote point. The Control Unit has 15 independent front panel toggle switches for easy control of 15 different ON/OFF functions. A momentary action switch is available on any one of the 15 positions if specified when ordering. The 7815 also includes 15 Status Channels, each with its own independent LED status indicator. The Remote Unit has the identical number of channels and indicators and also has a Local Control switch for on-site operation. Each toggle switch on the front panel of both Control and Remote Units commands an individual, electronically latched relay. Relay contacts are Form A floating from ground and are rated for AC or DC at 50 watts each. Either a switch closure or a change in logic level at the input of each channel (on the rear panel of the Remote Unit) will trigger the status monitoring circuitry and cause the appropriate LED indicator to turn on. Any ON/OFF combination of up to 15 channels can occur. The 7815 uses FSK data transmission techniques and transmits full duplex (simultaneously in both directions) via telephone line. Data modems are also built-in, and both control and status information are updated approximately every 300 milliseconds.

Data integrity, is maintained by a unique system of “double scan/compare” logic. In operation, each command digital word is sent twice via the data modem, and both words are compared, bit for bit, in parallel. The output register is then updated only if every bit matches. This virtually eliminates the possibility of error in the control functions. The Model 7815 can be operated without telephone lines by using external subcarrier generators and demodulators for interconnection. Barrier strips are provided on the Remote Unit for status input and control output connections.

**COMPLETE "ROUND TRIP"**

**MODEL 7815 FUNCTIONALITY**

1. **CONTROL TOGGLE SWITCH** activation causes specific digital command to be transmitted to Remote Unit where it’s decoded. The toggle switch contacts can be wired externally through the rear barrier strip. Momentary action switches are also available if specified.

2. **STATUS LIGHTS** for each control channel provide verification that function was performed at remote location. External alarm device can also be connected through rear barrier strip and activated simultaneously with Status Light.

3. **REMOVABLE INDEXING PANEL** is provided for writing or typing various control and status information.

**CHANNEL EXPANSION**

Model 7830, Channel Expander—By connecting one or two Model 7830’s to the Model 7815 the control and status channels may be extended to 30 or 45 each, respectively. The specifications of the Model 7830 are the same as that of the Model 7815. Digital data of the 7830 is transmitted via the UART and FSK modems in the Model 7815.

Model 7832, Channel Expander—The addition of one 7832 will provide 32 status only channels to the 7815. Up to two Model 7832’s or combination of a Model 7830 and Model 7832 may be added to the Model 7815.
**P" DIGITAL OPERATION**

**ONAL DESCRIPTION**

4. **CONTROL RELAY CONTACTS** on the rear panel of the Remote Unit are bridged when a specific digital command is received. Relay closure activates remote function.

5. **STATUS INPUT** occurs when function under control is activated. This causes a digital word to be transmitted back to the Control Unit which illuminates Status Light.

6. **LOCAL CONTROL SWITCH** on the Remote Unit allows override of the Control Unit so that full operation including command and status can be performed at remote location.

**APPLICATIONS**

- Broadcast
- Process Control
- Pipeline
- Microwave Link
- Antenna Control
- Telephone Companies
- Power Transmission Equipment
- Dam Flood Gate Control

The 7815 has the ability to directly control up to 15 ON/OFF functions remotely. These may include such go/no-go operations as filament voltage, plate voltage, main power, overload reset, tower lights, program source selection and others. It can also be used to economically expand status monitoring and control in installations already using analog remote control equipment.

**MULTI-SITE OPERATION**

Up to 16 sites can be controlled and monitored by a Model 7815C through the use of the Model 7616 Site Selector. The Model 7616 Manual Site Selector selects one of the sixteen sites and performs command and status functions without interference from one site to the other.

**ORDERING INFORMATION**

Specify number of momentary switches required and the type of interconnection to be used (two-wire, four-wire, full-duplex radio or other). Specify subcarrier frequency or frequencies when ordering option 01.

**OPTIONS**

Option 01: Time Share Capability — Timeshare of Telco link or STL/SCA links is possible through an existing remote control system without affecting remote operation.

Option 02: Spare Parts Kit — To provide spare parts such as relays, I.C.'s and other critical components for emergency repair.

Option 03: Momentary Switch Kit — 8 momentary switches and instructions for replacing front panel toggle switches.

**TIME SHARING COMMUNICATION LINK WITH OTHER REMOTE CONTROL EQUIPMENT**

The addition of Option 01 to the Model 7815 enables it to share a communications link with another remote control system. Depressing the Transmit switch on the front panel momentarily interrupts the data link between control point and remote site. (Approximately two seconds.) During this interruption the Model 7815C communicates with the Model 7815R to exchange control and status data. During operation the link is interrupted periodically every one to five minutes (user adjustable) for updating the status report.

A front panel switch can prevent interruptions while the remote control equipment is performing control functions.
**SPECIFICATIONS**

### COMMAND TERMINAL
- **Number of Command Channels**: 15 to 45 in groups of 15
- **Number of Status Indicators (LED)**: 15 to 45 with control or 79 status only
- **Command Inputs**: Frontpanel ON/OFF toggle switches (momentary action switches available) or rear panel wiring through terminal strips.
- **External Status Indicator or Alarm**: External indicator or alarm can be wired through the rear panel strip for each status channel. Circuit is capable of driving TTL loads.
- **Command Response Time**: Less than 350 milliseconds.

### REMOTE TERMINAL
- **Number of Local Command Channels**: 15 to 45 in groups of 15
- **Number of Local Status Indicators**: 15 to 45 with Control or 79 Status only.
- **LOCAL/REMOTE Switch**: Converts Remote Control to Local Control for on site operation.
- **Command Output Connector**: Barrier strip on the rear panel strip for each individual channel to turn on the Status Light.
- **Status Input Connector**: Barrier strip on the rear panel.
- **Status Response Time**: Less than 350 Milliseconds.

### SYSTEM SPECIFICATIONS
- **Interconnections**
  - **Phone Line Option**: Series 3002 Data Circuit, C-2 conditioning; maximum allowable attenuation 30 dB, 600 ohm impedance, send level -6 dBm.
  - **Radio Option**: External Subcarrier Generator and Demodulator required.
  - **Command and Telemetry Failsafe**: Built-in detector to open relay contacts after detection of failure.
  - **Delay time adjustable from 20 to 55 seconds.**
- **Operating Temperature Range**: -10° to 50°C (14° to 122°F)
- **Physical Size**: 19” x 48.3 cm x 3½” H (8.9 cm) x 13½ D (33 cm)
- **Power Requirement System**: 120/240 VAC ± 10%, 50/60 Hz. 12 watts per terminal.
- **Shipping Weight**: 35 lbs. (15.9 kg).

### SYSTEM BLOCK DIAGRAM

![System Block Diagram]

**REPRESENTED BY**

TIME AND FREQUENCY TECHNOLOGY, INC.
3090 Oakmead Village Dr., Santa Clara, CA. 95051 (408) 246-6365 TWX 910-338-0584
Easy Installation and Maintenance

A Fullest Complement of Options and Accessories

In addition to the basic system components of Series 7900, many special options provide additional control and operator convenience. These include:

- Option 01 - Generator Board for subcarrier operation in RF link frequencies
- Option 02 - Generator Board for subcarrier operation in RF link frequencies
- Option 03 - Model 400 CRT Terminal and Keyboard

9700 SERIES SPECIFICATIONS

Type of System: Microprocessor Board
Front Panel
Shelves: One, Chain, Timer, Gate built-in 4.4
Width: Width for maximum compactness of units of equipment
System Condition: Complete set of Max. & Min.
Input Ranges, and the Check for proper operation
Keyboard: Keypad. Twinkle dual function key board at both control and remote sites
Channel Index: Front panel channel index card
Remote Box Capability: 1 to 4, basic standard expandable to
Channel Options: 80 channels per site in increments of
Alarm Response Time: 2 seconds typical for a single site system
Remote Channels: 16 channel increments, up to 96
Heartbeat: 60/50 Hz, A/B, 150/120 Hz
Accuracy: 1 to 4 analog channels
Sweeps: 32 analog channels
Calibration: Software calibration with automatic
REAS/ITEMIZE Control: Rear control columns indexed 50
Motor Brake: 70 channels
Expandability: Expose up to 96 channels in increments of 16 channels or 32

REPRESENTED BY:

Model 400 CRT Terminal
Model 43 Printer

7900 A Remote Control/Data Acquisition System So Advanced IT ALMOST THINKS FOR ITSELF!

± 1200 BPS Half Duplex Crystal Controlled FSK Modems
Full 4- Digit Telemetry Display
Alphanumeric Units of Measure
Direct ON/OFF and RAISE/LOWER Controls
Status Reporting

Model 400 CRT
Model 43 Printer

...3900 OAKMEAD VILLAGE DR., SANTA CLARA, CA. 95051 • (408) 737-7722 TWX 910-338-0584
Supervisory Control, Data Acquisition, and More

GENERAL DESCRIPTION

Model 7900 Remote Control is a microprocessor-based supervisory, control and data acquisition terminal that can be interfaced to both the central and remote sites. It has the ability to provide automatic control for numerous environments, including those where feedback loops are used for data acquisition. It also provides reliable relay protection for hazardous environments, even in hostile environments.

Software features of the Series 7900 include computations, interfaced and expanded logic, alarm annunciation and error messaging, trend observation, remote control, remote monitoring and communication capabilities. Dual Power, Indirect Power and Advanced Features are all provided, as well as accounting to powerovar readings, and controlling the system clock.

The 7900 is expandable to two modular combinations and many additional features.

The 7900 System is expandable to two modular combinations and many additional features.

VERSATILE FRONT PANELS

Model 7900’s comprehensive front panel allows for full operation without a CRT or telephone. Interchangeable at both the central and remote terminals with keyboard control and full display at both ends makes this possible. Both programmable and computer terminals are executed through 16-key, dual function, touch screen – no computer interface is required. Additional features are incorporated in the optional attachment for the 7900 front panel. (See page 329 for details).

HIGH SPEED COMMUNICATIONS

Model 7900 communications format employs 1394 BPS time division multiplexing methods. This means for example, that if RADIALCOM control is not being used, the modem is used for the integration monitoring function, which allows for fast operation. Transmission errors are eliminated with the 7900’s direct digital output.

MODEL 7900 also provides an interface for automatic switch-over to an alternate data path (TFT Model 1020-01) in the event of line failure.

MULTI SITE OPERATION

Support for many remote sites also had to a single Master Terminal. However, has been built into Model 7900. It can monitor and operate up to 63 remote sites from a single central site.

LOGGING & DISPLAY

Normal display is of up to eight channels with each eight characters wide. Units also include a special CRT ‘tall boy’ display, which allows you to view all 999 channels for any selected remote site.

Model 7900 can handle a CRT and four points on the control panel as well as a printer of each remote site, simultaneously.

SELECTIVE CHANNEL MUTING

A group of up to 16 channels can be assigned to any of six CHANNEL DISABLES, run on the rear panel of the Remote Terminal Model 7901. Each can be controlled by a built-in time clock or external contact closures. In addition, there are two panel programmable time clock options are provided for the time of day and DCF measurements.

Fingertip Front Panel Command Plus Instantaneous Status

As shown in the various data displays below, Series 7900 can be configured in a variety of ways. Up to two Tire Mode 7911s and up to 63 site Model 7901’s can be configured for a site. The 7901 can provide both the central and remote site 7900 terminal and a central site is assigned a unique ‘site number’ via internal programming.

MODEL 7900 provides four separate communication lines, so that separate cards can be assigned to each of 4 remote sites. A Multi-Dimensional Communication Expandable provides:

- Full remotely configured communications
- Additional data for each remote site, up to the maximum number of channels (100). There may be any combination of remote controlling and monitoring operations on the Model 7901 can be used, per remote site, as required, and never requires module.

MODEL 7910 provides instant parallel access to the RAC/ LOVER control channels, allowing two-way communications and many additional features. It also digests these signals before sending them to the 7901’s RAC/LOVER control channel through modem-izing relay contact closures. Up to six 7910’s can be back-to-back connected to a 7901.

MODEL 7902/21 provides 16 status monitors by reading to a center source or TTU interface, and also provides 16-264 selection direct relay inputs per remote site. It is used in conjunction with a main control channel through relay contact closures. Up to 7902’s can be back-to-back connected to a 7901.

The master control site, a 7920 provides status channels and operations. Operation 7911 at the remote site is controlled by a central site, and the 7930 provides status display for the corresponding 7911 at the remote site. The 7900 and 7901 units at the may control the remote site’s computer, which is provided by a model 7901, or be distributed to the central control site.

At the master control site, a 7920 provides status data and check pulses. Operation 7911 at the remote site is controlled by a central site, and the 7930 provides status display for the corresponding 7911 at the remote site. The 7900 and 7901 units at the may control the remote site’s computer, which is provided by a model 7901, or be distributed to the central control site.

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MODEL 701 Frequency and Modulation

The Model 701 is an all-solid-state broadcast monitor optimized for off-the-air or on-site monitoring of all VHF and UHF broadcast transmitters. Digitally settable peak flas hers display plus and minus aural modulation peaks simultaneously. Frequency measurement accuracy can be calibrated directly against NBS with a WWV receiver.

Additional features include an illuminated meter scale, remote meter and flasher outputs, optional SCA output and built-in high accuracy aural modulation calibrator. Sensitivity is 250 uV. FCC TYPE APPROVED.

MODEL 702 Aural Modulation

Model 702 is the modulation only version of Model 701. All features including digitally settable peak flashers, built-in modulation calibrator, remote meter and flasher outputs, illuminated meter scale and a 250 uV sensitivity are included. Model 702 is specifically designed for those applications not requiring frequency monitoring. FCC TYPE APPROVED.

MODEL 753 with 754 Preselector

TFT Model 753 not only makes extremely accurate AM proof-of-performance measurements, but with the Model 754 Preselector addition, it allows you to monitor local competitors at the touch of a button and accurately measure modulation and carrier frequencies. Built-in high accuracy allows you to modulate the transmitter to the maximum legal limits of +125% and –100% in absolute confidence.

As with all TFT broadcast monitors, operation is simple and precise. Just dial in the appropriate frequency, set the carrier level and get instant read-out at the touch of a button. Digitally settable modulation peak flashers are also provided and are activated when modulation exceeds pre-set limits. Key features of the Preselector include frequency synthesized digital tuning, digital readout of frequency error and a unique IF filter design for optimum off-the-air modulation monitoring. MODEL 753 FCC TYPE APPROVED.

MODEL 755 Preselector

The Model 755 Preselector is essentially the same as the Model 754, without the frequency measurement, and has one set of thumbwheel selectors. With a TCXO timebase option, the Model 755 can be used for carrier frequency monitoring by using an external frequency counter that has an accurate time base.
For FM Broadcast . . .

- Direct off-the-air operation with Preselector
- Digital display of carrier and subcarrier frequencies
- Two RF inputs for local or remote use
- Preselector option for competitive comparisons
- Built-in modulation calibrator

MODEL 763 with 764 Preselector

Model 763 provides the same features for FM broadcast monitoring as Model 753 does for AM. In addition, both stereo and SCA monitoring capability can easily be added on. A high sensitivity preselector can also be added to Model 763 to provide fast, accurate off-the-air monitoring of local broadcast stations.

A full complement of modular plug-in options lets you tailor the 763 Monitor to your precise operational needs, building capability as you grow. All controls and calibrations are highly precise and easy to operate. Accuracy is within 1%. FCC TYPE APPROVED.

MODEL 724A Stereo Monitor

The Model 724A is designed for use with Model 763 to provide all stereo monitoring requirements and proof-of-performance measurements. In addition to the latest linear and digital ICs, computer designed filters provide highly accurate separation and crosstalk measurements. With the Model 724A, you can make complete measurements of right channel modulation, left channel modulation, channel separation, crosstalk between main and sub channels, L+R, L-R, 38 kHz carrier suppression and 19 kHz injection level. Superior separation measurements are achieved through the use of a phase-locked-loop (PLL) to regenerate the 38 kHz suppression carrier from the 19 kHz pilot carrier. FCC TYPE APPROVED.

MODEL 730A SCA Monitor

With Model 730A you can make complete and accurate measurements of injection level, modulation, S/N ratio and crosstalks. All measurement modes are selected by convenient front panel pushbuttons and, for added convenience, a 50 dB pushbutton meter attenuator is included. Furthermore, a wideband input is provided which allows you to make unrestricted distortion and frequency response measurements of the base band signal at the transmitter.

Model 730A also offers the user a choice of carrier frequencies for monitoring either the 41 kHz or 67 kHz subcarrier or other specified frequencies. When two subcarrier frequencies are included, selection is made by a front panel pushbutton. FCC TYPE APPROVED.

For Emergency Broadcast . . .

- Phase-locked-loop stereo demodulation
- Separate left and right modulation monitoring
- Pushbutton selection of functions and ranges
- Remote metering outputs
- Precision filters for SCA performance measurements
- Digitally settable peak flashers
- Built-in modulation calibrator
- Multiple SCA channel capability

MODEL 760 EBS System

The Model 760 EBS System is designed for broadcasters to meet Parts 73.940, 73.941 and 73.942 of the FCC Rules and Regulations for decoding and encoding the two-tone EBS alert signal. The modular construction of the system provides for maximum versatility and consists of a cabinet assembly, AM or FM receiver, two-tone decoder and two-tone generator. Two or three of these modules can be combined into a cost-effective operational EBS System. FCC TYPE ACCEPTED AND CERTIFIED.

TIME AND FREQUENCY TECHNOLOGY, INC.
3000 OLCOTT STREET, SANTA CLARA, CA 95051 (408) 246-5365 TWX No. 910-338-0584

Litho in U.S.A.
SPECIFICATIONS (cont.)

Off-Frequency and Over-Modulation Alarm
Available as an option ........................................... Includes circuit to actuate user-supplied aural or visual alarm
Frequency limits .................................................. ±1 kHz
Modulation limits ............................................... ±100%

Six-Digit Frequency Counter
Frequency range ................................................... 10 Hz to 10 MHz
Input sensitivity .................................................. 200 mv to 2 V RMS
Input impedance .................................................. 500 k ohms. Shunt by 15 pF
Resolution ............................................................. 1 Hz
Display accuracy .................................................. ±1 count
Time base aging rate ........................................... 1 x 10⁻⁶/day

Physical and Environmental Specifications
Size ................................................................. 11" w x 8" h x 15" d
Weight .............................................................. 22 pounds (approx)
Power ............................................................... 115/230 V, 50-400 Hz, 45 watts max.
Cabinet ............................................................. Portable or rack mount (with adapter)
Operating temperature ......................................... 0°C to 50°C

ACCESSORY EQUIPMENT
Model 703 super stable time base, 5.6" w x 8" h x 15" d. Mounts next to Model 701.
Model 704 Remote Meter and Flasher Panel, 19" w x 5-1/4" h x 3" d. Duplicates the Modulation Meter and Peak Modulation Flashers of the Model 701. FCC type approved.
Model 725 Automatic Logging Adapter and Digital Clock, Analog Voltage Outputs of Visual and Inter-carrier Frequency Errors, 5.6" w x 8" h x 15" d. Mounts next to Model 701.
Model 725A Combination of Model 703 and Model 725, 5.6" w x 8" h x 15" d. Mounts next to Model 701.

For more information and/or a demonstration, contact the factory at the address below, or your local representative.

Represented By

TIME AND FREQUENCY TECHNOLOGY, INC.
2960 SCOTT BLVD. – SANTA CLARA, CA. 95050 – (408) 246-6365