STEREO GENERATOR
MODEL 772

features

• 100% Solid State
• Completely Self-Contained
• "Time Division" Technique
• Negligible Distortion, Crosstalk and Noise
• Excellent 38KHz Suppression
• Excellent Separation
• High Level, Low Impedance Output
• Built-in tracked pre-emphasis
• Remote Mono-Stereo Switching
• Optional Phase Equalized Input Filters Available
• Requires only 3½" of Rack Space
• Dual Voltage Input 115/230VAC 50/60Hz

description

The QEI Model 772 Stereo Generator is an all solid state unit designed to meet or exceed the Federal Communications Commission requirements for stereo multiplex FM transmission.

The Generator is manufactured in a standard 3½" x 19" rack mount and is completely self-contained with its own power supply.

The composite signal is generated using the time division technique thereby reducing the complexity of the circuit and the number of adjustments.

With this technique, both left and right signals are passed through identical circuitry to the time division chopper. This insures the very close phase and amplitude tracking necessary for minimum crosstalk. A precision phase linear low pass filter is then used to attenuate all unwanted harmonics of the 38KHz switching wave form.

A low output impedance amplifier is used so that the high frequency components of the composite signal are not attenuated by the coaxial output cable.

Terminals are provided to allow remote mono stereo switching.
electrical specifications

Inputs (Right and Left)
  a) Frequency Range .............. 30 Hz-15 KHz
  b) Impedance .................. 600 ohms balanced
  c) Level ...................... +10 dbm ± 1 db

Frequency Response (30 Hz-15 KHz)
  a) Flat ........................ ± 0.5 db
  b) Pre-emphasized .............. 75 usec ± 1 db

Output (Composite)
  a) Impedance .............. less than 300 ohms
  b) Level ................ adj. less than 1 Vpp to over 6 Vpp

Stereo Separation
  (30 Hz-15 KHz) ................ Greater than 43 db

Crosstalk (30 Hz - 15 KHz)
  a) Main to Sub .................. 46 db
  b) Sub to Main .................. 46 db

38 KHz Suppression .................. 55 db

Noise (below 3.5 Vpp output) ........... 75 db

Distortion (Left or Right) ........... 0.15% THD
  0.2% IMD or TIM

Pilot Frequency .................. 19 KHz ± 1 Hz

Power Requirement ................ 105-125 Vac or 210-250 Vac

50/60 Hz

mechanical specifications

Dimensions .................. 3½" x 19" x 12"D

Net Weight .................. 6 lbs.

Shipping Weight ............ 8 lbs.

Maximum Operating Temperature ... 131°F (55°C) Ambient

optional equipment

Matched 15 KHz low pass filters (QEI Part No. L15K6LC) are available for use in the audio input lines if required. These filters are phase equalized to preserve the phase integrity of the program material. If this is not done, fundamental and harmonics will not maintain the proper time relationships and serious phase and transient distortion will result.

When ordering stereo Generators with filter specify QEI Model 772F.

QEI CORPORATION
One Airport Drive, P.O. Box D
Williamstown, N.J. 08094
(609) 728-2020

representative
FM EXCITER
MODEL 675

features

- FCC Type Accepted
- 100% Solid State
- Phase Locked
- Frequency Synthesized
- Stability ±300 Hz (0°C to 50°C) (3 ppm)
- No Oven Necessary
- "On Carrier" Direct FM
- Negligible Distortion, Crosstalk and Noise
- Negligible Stereo Degradation
- Protected against Microphonics
- "VSWR Proof"
- Unconditionally Stable Amplifier
- Adjustable Power Output (5 to 20 watts)
- Requires only 3½" of Rack Space

description

The QEI Type 675 FM Exciter is an all solid state, on carrier direct FM, phase locked, frequency synthesized exciter designed to meet or exceed the FCC requirements for use in the standard FM broadcast band, (88-108 MHz). The Exciter may be programmed to operate on any 100 KHz increment in the FM band using the same high stability 8 MHz crystal as a reference. Since a phase locked loop requires a phase error (not a frequency error) in order to generate its correction signal, the FMO exhibits the same frequency stability as the reference crystal oscillator. Therefore, the frequency drift associated with frequency locked loop exciters is eliminated and with it the necessity for an oven. "On carrier" operation insures freedom from spurious responses along with extremely low distortion, crosstalk, noise and stereo degradation. In addition, the FMO itself is sealed in steel and foam to protect it from stray magnetic fields and microphonics.

The Power Amplifier is unconditionally stable and capable of withstanding any magnitude or phase of VSWR indefinitely without damage. Power can be varied from less than 5 watts to greater than 20 watts without "break up" or oscillation.

The Exciter requires only 3½" of rack space and is completely self-contained. All devices are operated conservatively well within their ratings. An optional meter panel is available which enables the Exciter to be used as a low power transmitter. A companion Stereo Generator, QEI Model 772, is also available.

QEI CORPORATION
One Airport Drive, P.O. Box D
Williamstown, N.J. 08094
(609) 728-2020
electrical specifications

Primary Power .................................. 105-125/210-250VAC 50/60 Hz
Power Consumption ............................ Approx. 50W max
Power Output ................................... Adj 5w to 20w
Frequency Range ............................... 88MHz to 108MHz (Programmable)
Type of Emission ............................... 180F3 or 300F9
Modulation Capability ......................... 150KHz peak dev.
   (less than 1% THD)
Frequency Stability ............................ ±300Hz (-10°C to +55°C)
Output Impedance ................................ 50 ohms
VSWR Protection ................................. Any magnitude or phase
Harmonic & Spurious Suppression ............ better than 70db
Mono Input
   1. Impedance ................................. 600 ohms (balanced)
   2. Level .................................. +10dbm ±1db (100% =75 KHz dev)
   3. Pre-emphasis ...................... 75usec ±1db (50usec optional)
Stereo Input
   1. Impedance ................................. 10K
   2. Level .................................. 3.5Vpp (100% =75KHz dev)
SCA Inputs (2)
   1. Impedance ................................. 10K
   2. Level .................................. 1Vpp = 10% INJ.
Distortion ...................................... 0.25% max. THD @75KHz
FM Noise (below 75KHz dev with .... better than−70db
   75 us de-emp)
AM Noise ...................................... better than−55db
Stereo Separation ......................... better than 40db from 30 Hz to
   15KHz with QE! Model 772 Stereo Generator
Crosstalk (Main to SCA) ....................... −55db
Crosstalk (SCA to Main) ..................... −65db
Environmental ............................ 0°C to +55°C operating

See our companion Stereo Generator Model 772
ARC-27 Puts You In Control

The ARC-27 Transmitter Remote Control System provides complete microprocessor remote control of your transmitter from the studio or any remote location.

The ARC-27 is a specially designed, fully integrated and factory-tested system for use with the QEI “New Reliability” line of FM transmitters, available in 3KW, 3.5KW, 5KW, 10KW, 15KW, 20KW and 30KW configurations.

The system consists of one or two ARC-27 Studio Units and a Transmitter Subsystem. 

TheARC-27 measures a host of transmitter functions continuously, and provides a record of important parameters and faults. Alarms warn of any critical condition. A personal computer or terminal can also be used for two-way interrogation of the transmitter or the studio.

Knowledge at Your Fingertips

The Transmitter Subsystem of the ARC-27 monitors up to 69 analog metering points and up to 29 fault indications, giving you a full picture of your transmitter’s condition. Analog measurements include internal and external temperature, exciter and power amplifier VSWR, direct and indirect power, and four optional user-defined metering points. Fault indications alert you to low modulation, overmodulation, tower light failure, security breaches, fire, system interlock, and more.

Transmitter Subsystem

Located in the transmitter’s Meter Panel, the ARC-27 Subsystem reads transmitter functions and stores the readings, along with the time, in a continuously updated Working Table.

If a fault occurs, the current Working Table is stored as a Fault Table that indicates the type of fault and the day and time it occurred. As many as four Fault Tables can be stored, providing a clear record of transmitter parameters immediately preceding a fault.

Compact Studio Unit

The compact ARC-27 Studio Unit, which requires only 3½ inches of rack space, provides the remote indications and control for the system. It provides quick access to transmitter functions and information stored in the Working Table, Fault Table, History Table and Alarm Stack.

The dedicated control panel of the studio unit features a 32-character alphanumeric LCD display with plain English messages, a 12-digit membrane keypad for system interrogation, an audible alarm, a transmitter raise/lower power toggle switch, dedicated buttons for Transmitter On and Off, and an auxiliary back-panel alarm output. Status LEDs indicate Critical Alarm, Check Alarm, Off/Air, plus the presence of data transmission, stereo output, and exciters.

Three Alarm Categories

The ARC-27 offers full-featured alarm capabilities, with alarms classified according to urgency. Up to 50 alarm trip points are set at the factory, and the last 50 alarm occurrences are stored in the Alarm Stack of the Transmitter Subsystem. Alarms are fully logged, including occurrence and clearing times.

There are three alarm categories: (1) Check Alarm, when a set point has been exceeded and the Check Alarm light is lit; (2) Fault Alarm, which copies the current reading into a Fault Table for later diagnosis; and lights the Fault Alarm indicator; and (3) Critical Alarm, which sounds an audible alarm at the studio and displays the nature of the alarm in plain English on the alpha-numeric LCD display.

Long-Term Record-Keeping

For a long-term record of transmitter operation the ARC-27 automatically stores the transmitter Working Table every 3½ hours, as a History Table. Up to 14 hours of these History Tables are stored internally. In addition, Working Table data may be dumped to the ARC-27 at user-selected intervals and used to update the status display in Operator Mode. An RS-232 port is provided on the rear panel for connection of a serial printer. The printer will autolog all readings every 3½ hours, plus any alarms when they occur.

Sophisticated Communication Features

The ARC-27 provides an array of communication and terminal features that can be configured to fit the user’s needs. It works over STL/SCA systems, voice-grade telephone lines, or a combination of the two. The necessary modem and/or SCA generator, encoders, and decoders are included in the system.

The optional terminal package includes operator-set password protection, and control of all transmitter and user functions, with feedback from any dial-up phone line. Also provided with this option is Autodial notification with multiple number dialing in the event of a critical alarm.

Remote Point Monitoring and Factory Assistance

QEI customers receive free telephone support and assistance for the lifetime of all transmitter and remote control products. In addition, the factory can access the transmitter directly to provide computer definition of a fault or a review of the transmitter’s operating parameters.
## Specifications

### Functions
- Dedicated Controls: XMTR ON, XMTR OFF, RAISE OR LOWER POWER OUTPUT

### Diagnostics
- By Keypad

### Display
- Status, Alarms or Call-ups: LCD Illuminated
- Check Alarm Indicator: Red LED
- Data Present Indicator: Green LED
- Stereo Indicator: Yellow LED
- Auto Mod Indicator: Yellow LED

### Status Read-Out (LCD)
- Ep, Ip, Calculated Indirect Power and Time

### Alarms
- Critical: Red LED
- Off-air: Red LED
- Audible: Sonalert (Switchable)

### Dimensions
- 31.5" H x 19" W x 12" D

### Weight
- 15 lbs.

### Options
- STL/SCA Configurations
- Additional Four User-Defined Control Channels
- Terminal Package For Multiple Location Control Via Dial-Up Phone Lines Plus Autodial Alarm Notification

### ARC-27
**Automatic Transmitter Remote Control System**

For QEI 1KW — 30KW FM Broadcast Transmitters

- Complete self-contained microprocessor remote control — including studio unit
- Continuous measurement and storage of important transmitter parameters
- Provides full two-way communication between studio and transmitter
- Operates over standard voice-grade telephone lines, STL/SCA, or any combination
- Provides complete record of transmitter operation & faults
- Plain English LCD readout, plus audible alarm
- Up to 50 alarms including occurrence times and clearance times are supported
- Password-protected control and inquiry with auto-dial alarm notification is available
- Dual-mode membrane keypad locks to prevent unauthorized use
- LEDs indicate operational status and alarm conditions

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**QEI Corporation**

One Airport Drive/P.O. Box D/Williamstown, NJ 08094/1609) 728-2020/Toll Free (800) 334-9154/Telex 510-686-9402
Introducing
"The New Reliables"

QEI FMQ-series transmitters offer a unique package of features and total reliability. QEI excels in setting industry standards. The IPA design draws on QEI's extensive experience in solid state low power FM transmitters. The IPA is mated to a single-tube grounded grid triode for unsurpassed stability. And the control functions and remote control reflect QEI's expertise in microprocessor technology.

Alarm points on all key parameters will warn you before a critical failure occurs. Automatic power and modulation controls keep the transmitter within FCC operating limits at all times; ideal for automated or satellite-programmed stations. A spare parts kit covering all solid state components is included with each transmitter.

The FMQ-3500 and FMQ-5000 are conservatively designed to provide many years of trouble-free service and superb audio quality.

Intermediate Power Amplifier (IPA)

The newly-designed, 100% solid state IPA assembly consists of:
1. An automatic power control/splitter module
2. One (for 3.5 KW) or Two (for 5 KW) 250 watt amplifier modules
3. A combiner module.

The IPA provides sufficient drive plus a generous amount of additional headroom to the final power amplifier to ensure that the transmitter RF output power remains precisely at its pre-set level over the full life of the PA tube.

Each amplifier module in the IPA incorporates its own protective circuitry. Complete access to all IPA modules is provided by lowering a trap door. Removal of the IPA assembly is as simple as the model number suggests. Replacement is as quick as you can keep you hands dry! Any module may be removed and re-installed while the transmitter is in operation.

The Power Amplifier

The conservatively design...

FMQ Control Panel

QEI has taken great care in designing the control panel for the FMQ "New Reliabilities" transmitters. Extensive test, monitor and control functions are logically grouped and clearly identified for the operator's convenience. The entire panel glides out on heavy-duty suspension rails for easy access. In conjunction with the ARC-27 Automatic Remote Control, a complete diagnostic center is provided.

Status and Local Control

Just a single glance gives you a complete picture of the transmitter's operational status. The Local Control section has color-coded pushbuttons to initiate an operator sequence. As the operational condition changes, the result is displayed by illuminated color-coded status lamps. Interlock status is identified by clearly marked red LED indicators.

695 Exciter and ARC-27 Remote Control Complete The System

The QEI 695 Exciter is the most advanced FM exciter available; the ideal complement to QEI's "New Reliabilities" FM transmitters. For rock-steady performance, the 695 employs a phase-locked-loop oscillator. The 695's vircar rectifier circuitry assures superb modulation linearity over a wide-range of temperatures. Fully broadbanded throughout, the "TRANSPARENT PLUS" 695 Exciter features extremely low distortion (typically less than .02%) and almost unmeasurably low noise levels. Up to three SCA's can be accommodated, with virtually no IM distortion.

The 695's long list of features include complete test and monitoring facilities, including total modulation metering with peak indicator and spectrum analyzer output. All key operating parameters can be monitored locally or at the studio, via the ARC-27 Remote Control System.

For full details on the 695 Exciter and ARC-27 Automatic Remote Control, see the separate brochure covering each unit.

Metering

Five meters provide full PA and IPA monitoring. PA plate voltage and PA plate current are displayed on two dedicated meters. A separate meter indicates forward/reverse PA output power as well as grid current. An IPA meter monitors nine selectable points, including voltage, current, forward/reverse power from the exciter as well as forward/reverse power from the IPA to the power amplifier. A multimeter checks four additional parameters, including AC line and control ladder voltages. An elapsed time meter keeps track of PA tube filament hours.

Fault Annunciator

Covers the following conditions:
- IPA overvoltage or overcurrent
- PA overvoltage or overcurrent
- VSWR exceeds transmitter limit
- Over temperature

If at any time, any of these faults should occur, the appropriate descriptive block will light on the Fault Annunciator Panel.

Mechanical

The entire transmitter is self-contained in a single, modern, heavy-duty steel cabinet. The base of the cabinet is reinforced 12-gauge steel on which the heavy power supply components are mounted. The control panel is mounted across the center of the cabinet and slides out for complete accessibility. Above the exciter is 10% of available rack space, which can be used for auxiliary equipment (e.g. an STL receiver) eliminating the need for an additional rack cabinet.

Transmitter Front View - Doors Removed

Rear View - Showing Harmonic Filter at Top.

A rear door allows access to those portions of the transmitter not accessible from the front. A rear mounted fan maintains positive air pressure inside the cabinet, while a separate blower cools the tube. The air filter is mounted externally, for ease of replacement and is a standard item available anywhere. The PA compartment is completely accessible from the rear by removing an access panel. The transmitter and its operator are protected from dangerous operating conditions by door, temperature, air pressure, and safety interlock switches and by an interlocked grounding stick.
Specifications

Electrical and Mechanical
AC Power Requirements ... 208-240 VAC Single Phase 50/60 Hz
Power Consumption ... 464 W @ 370 W; RF Out Power
Power Consumption ... 955 W @ 550 W; RF Out Power
Dimensions ... 24"W x 76"H x 30" D.
Weight ... 930 Lbs (423 Kg)

Controls and Status Indicators
Tune and Load ... Motorized, with 3 position
momentary switches (center off)
RF Output Power ... 3 position Raise/Lower switch,
(center off)
Status Indicators ... Line Ready, Fil. On; H.V. Ready;
Low Power; H.V. Ommeter/Switches ... Multimeter; 4 Function Pushbuttons
IPA Metering; 9 Function Pushbuttons
PA Plate Voltage Meter
PA Plate Current Meter
PA Grid Current — Switchable to:
Forward and Reverse RF Power Output
Fault Annunciator Panel ... Output VSWR; IPA VSWR;
IPA; PA Grid; PA Plate; Over Temp; Over Current;
Over Voltage
Interlock Indicators ... Air Temp; Meter Panel; Front
Panel; Rear Door; PA Rear Cover; Aux.
Local Control Pushbuttons ... Off; Fil. On/H.V. Off;
RF On — Low; RF On — High; Local/Remote Switch
Auto Remote Control ... Keypad; Indicators and LCD
Panel ... Supplied with ARC-27 Remote Control
Lower Front Panel ... Filament Voltage Adjust; PA Input
Tune & Load Controls; Main, +45 V & Filament
Circuit Breakers; Filament Hour Meter

Performance
Power Output FMQ-3500 ..... 1000-3750 Watts
Power Output FMQ-5000 ..... 1500-5500 Watts
Frequency Range ... 875 to 108 MHz
Frequency Selection Synthesizer ... 10 kHz Steps
(Output Impedance/Connector ... 50 Ohms, 1 5/8" EIA
Stability vs. Temperature ... ±200 kHz, 0-50°C
Distortion (THD) ... 0.25%
Distortion (IMD) ... 0.25%
Transmit Intermod. Dist. (TIM) ... 0.25%
FM Noise ... Better than —75dB
AM Noise ... Better than —55dB
Harmonic Suppression ... At least —80dB
Spurious Suppression ... At least —90dB
Mono Input ... +10 dBm @ 600 Ohms
Stereo Input ... 1.5 V p-p @ 10 K Ohms
SCA Input ... 1.5 V p-p @ 10 K Ohms
(for 10% Injection)

Options
ARC-27 Microprocessor-based Automatic Remote Control
— For wire connection ... Add/01 to Model Number
— For STL connection ... Add/02 to Model Number
(includes option /03 — 695 Exciter replacing 675
Exciter)

Four extra remote control channels for user-defined purposes
— (Required option /01 or /02 ... Add /04 to Model Number)
Model 695 Exciter
— (Replacing Model 675 Exciter) ... Add /03 to Model Number

The QEI 695 Exciter and ARC-27 Automatic Remote Con-
trol are briefly described in this brochure. Both products
are covered fully in separate brochures available from QEI.

QEI Corporation
One Airport Drive/ P.O. Box D/ Williamstown, NJ 08094/(609) 728-2020/Toll Free (800) 334-9154/ Telex 510-686-9402
Introducing “The New Reliables”

QEI FMQ-series transmitters offer a unique package of features and total reliability. QEI excites standard industry standards. The design plans for QEI's extensive experience in solid state low power FM transmitters. The IPA is mated to a single-tube grounded grid triode for unsurpassed stability. And the control functions and remote control reflect QEI's expertise in microprocessor technology.

Alarm points on all key parameters will warn you before a critical failure occurs. Automatic power and modulation controls keep the transmitter within FCC operating limits at all times; ideal for automated or satellite-programmed stations. A spare part kit covering all solid state components is included with each transmitter.

QEI's new single cabinet FMQ-10000 is conservatively designed to provide many years of trouble-free service and superb audio quality.

Intermediate Power Amplifier (IPA)

The newly-designed, 100% solid state IPA assembly consists of:

1. An automatic power control/splitter module
2. Three 250 watt amplifier modules
3. A combiner module.

The IPA provides sufficient drive plus a generous amount of additional headroom to the final power amplifier to ensure that the transmitter RF output power remains precisely at its pre-set level over the full life of the PA tube.

Each amplifier module in the IPA incorporates its own protective circuitry. Complete access to all IPA modules is provided by lowering a hinged front panel. All connections are accessible from the front panel to provide easy recabling. Thus, any module may be connected directly to the final power amplifier, providing a quick and easy "work-around" in the event a module ever fails. Any module may be removed and re-installed while the transmitter is in operation.

The Power Amplifier

QEI has taken great care in designing the control panel for the FMQ-"New Reliables" transmitters. Extensive test, monitor and control functions are logically grouped and clearly identified for the operator's convenience. The entire panel glides out on heavy-duty suspension rails for easy access. In conjunction with the ARC-27 Automatic Remote Control, a complete diagnostic center is provided.

QEI's conservatively designed FMQ-10000 power amplifier uses an Emac YU148 triode in grounded grid service. Our grounded grid triode design, although requiring higher drive level than a tetrode or pentode, offers inherently greater stability and is less critical in operation because it does not require neutralization.

The FMQ-series has been designed for easy, straightforward and safe access to all components. Tuning lines and component mountings are extremely rugged. The input tuning and loading controls are conveniently mounted on a front panel and are exceptionally smooth in operation. The motor-driven output tune and load lines are controlled by momentary switches on the front panel, and front panel adjustment is also provided for setting the filament voltage.

Both air flow and temperature are continually monitored. All PA operating parameters are metered on the control panel, including forward and reflected power. The 1 5/8" EA RF output connector is top-mounted.

695 Exciter and ARC-27 Remote Control Complete The System

The 695 Exciter is the most advanced FM exciter available; the ideal complement to QEI's "New Reliables" FM transmitters. For rock-steady performance, the 695 employs a phase-locked-loop oscillator. The 695's varicap circuitry assures superb modulation linearity over a wide range of temperatures. Fully broadbanded throughout, the "TRANSPARENT PLUS" 695 Exciter features extremely low distortion (typically less than 0.2%) and almost unmeasurable low noise levels. Up to three SSA's can be accommodated, with virtually no IM distortion.

The 695's long list of features includes complete test and monitoring facilities, including total modulation metering with peak indicator and spectrum analyzer output. All key operating parameters can be monitored locally or at the studio, via the ARC-27 Remote Control System.

For full details on the 695 Exciter and ARC-27 Automatic Remote Control, see the separate brochure covering each unit.

FMQ Control Panel

QEI has taken great care in designing the control panel for the FMQ-"New Reliables" transmitters. Extensive test, monitor and control functions are logically grouped and clearly identified for the operator's convenience. The entire panel glides out on heavy-duty suspension rails for easy access. In conjunction with the ARC-27 Automatic Remote Control, a complete diagnostic center is provided.

Status and Local Control

Just a single glance gives you a complete picture of the transmitter's operational status. The Local Control section has color-coded pushbuttons to initiate an operator sequence. As the operational condition changes, the result is displayed by illuminated color-coded status lamps. Interlock status is identified by clearly marked red LED indicators.

Metering

Five meters provide full PA and IPA monitoring. PA plate current and PA plate voltage are displayed on two dedicated meters. A separate meter indicates forward/reverse PA output power as well as grid current. An IPA meter monitors nine selectable points, including voltage, current, forward/reverse power from the exciter as well as forward/reverse power from the IPA to the power amplifier. A multimeter checks four additional parameters, including AC line and control-ladder voltages. An elapsed time meter keeps track of PA tube filament hours.

Fault Annunciator

Covers the following conditions:
- IPA overvoltage or overcurrent
- PA overvoltage or overcurrent
- VSWR exceeds transmitter limit
- Over temperature

If at any time, any of these faults should occur, the appropriate descriptive block will light on the Fault Annunciator Panel.

Mechanical

The entire transmitter is self-contained in a single, modern, heavy-duty steel cabinet. The base of the cabinet is reinforced 12-gauge steel on which the heavy power supply components are mounted. The control panel is mounted across the center of the cabinet and slides out for complete accessibility. Above the exciter is 10 1/2" of available rack space, which can be used for auxiliary equipment (eg, an STL received eliminating the need for an additional rack cabinet).
Specifications

Electrical and Mechanical
AC Power Requirements .................................................. 208-240 VAC Single Phase
Power Consumption ............................................... 875 to 108 MHz
Dimensions .................................................. (61 cm x 93 cm x 76 cm)
Weight .................................................. 1900 Lbs. (445 Kg)

Controls and Status Indicators
Tune and Load ........................................ 3 position momentary switch (center off)
RF Output Power ........................................ 3 position Raise/Lower switch, (center off)
Status Indicators ........................................ Line Ready, Fill; On; H.V. Ready; Low Power; H.V. On
Metering/Switches ........................................ Multimeter: 4 Function Pushbuttons
IPM Metering: 9 Function Pushbuttons
PA Plate Voltage Meter
PA Plate Current Meter
PA Grid Current — Switchable to: Farward and Reverse RF Power Output
Fault Annunciator Panel ........................................ Output VSWR; IPM VSWR;
IPA; PA Grid; PA Plate; Over Temp; Over Current; Over Voltage
Interlock Indicators ........................................ Air/Temp; Meter Panel; Front Panel; Rear Door; PA Rear Cover; Aux.
Local Control Pushbuttons ........................................ On/Off; Fill; On/H.V. Off;
RF On — Low; RF On — High; Local/Remote Switch
Auto Remote Control ........................................ Keysad; Indicators and LCD Panel — Supplied with ARC-27 Remote Control
Lower Front Panel ........................................ Filament Voltage Adjust; PA Input
Tune & Load Controls; Main: 45 V & Filament Circuit Breakers; Filament Hour Meter

Performance
Power Output FMQ-10000 ........................................ 5000-10500 Watts
Frequency Range ............................................... 875 to 108 MHz
Frequency Selection Synthesizer ................................... 100 kHz Steps
Output Impedance/Connector .................................. 50 Ohms, 1.5/8" FIA
Stability vs. Temperature ................................... ±100 Hz; 0-50°C
Distortion (THD) ........................................... <0.25%
Distortion (IMD) ........................................... <0.25%
Transient Intermod. Dist. (TIM) ................................... <0.25%
FM Noise ........................................ Better than — 75 dB
AM Noise ........................................ Better than — 55 dB
Harmonic Suppression .................................. At least — 80 dB
Spurious Suppression .................................. At least — 90 dB
Micro Input ........................................ ±10 dBm @ 600 Ohms
Stereo Input ........................................ 0.7 V p-p @ 10 K Ohms
SCA Input ........................................ 1 V rms @ 10 K Ohms
(for 10% Injection)

Options
ARC-27 Microprocessor-based Automatic Remote Control
— For wire connection .................................. Add/01 to Model Number
— For STL connection .................................. Add/02 to Model Number
(Includes option J03 — 695 Exciter replacing 675 Exciter)

Four extra remote control channels for user-defined purposes
— (Required option J01 or J02) .................................. Add J04 to Model Number

Model 695 Exciter
— (Replacing Model 675 Exciter) Add J03 to Model Number

The QEI 695 Exciter and ARC-27 Automatic Remote Control
are briefly described in this brochure. Both products
are covered fully in separate brochures available from QEI.

QEI Corporation
One Airport Drive/PO. Box D/Williamstown, NJ 08094/(609) 728-2020/Toll Free (800) 334-9154/Telex 510-686-9402

FMQ-10000
10 KW FM Broadcast Transmitter

• Designed For Ultra-Reliability
• Single Tube Design — A Grounded Grid Eimac YU48 Triode
• Highly Stable; Never Requires Neutralization
• No Conventional Plate Blocker
• No Trouble-Prone Sliding Contacts
• Motorized Tuning Controls
• Superb Audio Performance
• Complete Transmitter Status At A Glance
• Choice Of Dependable QEI Exciters
• "Automod" Automatic Modulation Control
• Automatic Power Control
• Integrated Full Remote Control Includes Studio Unit
• Microprocessor-Based Diagnostics With Remote Option
• Single-Phase Power Supply Standard

1500 HOUR TUBE WARRANTY

QEI invests an ongoing program of research and development to insure the finest product performance and quality. These specifications are therefore subject to change without notice.
The FMQ-20000 and FMQ-30000 transmitters include the latest technological advances coupled with QEI's traditional conservative and efficient design. As with all QEI FMQ-series transmitters, they offer a unique package of features and total reliability. The intelligent three-cabinet layout of these transmitters includes separate Driver, Power and Control, and Power Amplifier cabinets.

QEI transmitters have set industry standards. The Exciter section of the FMQ-20000 and FMQ-30000 reflects fourth generation technology. (Over 1000 QEI Exciters are in daily use.) For total reliability, the Driver units of these transmitters are actually self-contained medium power QEI transmitters. The Driver is mated to a single-tube grounded grid triode for unsurpassed stability. Controls on the FMQ-20000 and FMQ-30000 are a model of complete functionality without needless complexity. Completing the package, our ARC-27 remote control reflects QEI's expertise in microprocessor technology.

Alarm points on all key parameters will warn you before a critical failure results. Automatic power and modulation controls keep the transmitter within FCC operating limits at all times. Ideal for automated or satellite-programmed stations. A spare parts kit covering all solid state components, including the exciter, is provided with each transmitter.

The FMQ-20000 and FMQ-30000 are conservatively designed to provide many years of trouble-free service and superb audio quality.

The Power Amplifier

The conservatively designed FMQ-20000 and FMQ-30000 power amplifiers use a 3X35000A2 triode in ground grid service. Our grounded grid triode design, although requiring higher drive level than a tetrode or pentode, offers inherently greater stability and is less critical in operation because it does not require neutralization. The circuitry itself is inherently broadband for superior stereo performance.

The FMQ-series has been designed for easy, straightforward and safe access to all components. The tuning assembly and component mountings are extremely rugged. The motor-driven output tuning and load pots are controlled by momentary switches on the front panel, and front panel adjustment is also provided for setting the filament voltage. The 3 1/8" EIA RF output connector is top-mounted. Both air flow and temperature are continuously monitored. All PA operating parameters are monitored on the control panel, including forward and reflected power. When equipped with the ARC-27 remote control system, all readings are accessible from both studio unit and dial-up phone line.

FMQ Control Panels

QEI has taken great care in designing the control panels for the FMQ "New Reliability" transmitters. Extensive test, monitor and control functions are logically grouped and clearly identified for the operator's convenience. The entire control panels on the Driver and the Power and Control cabinets glide out on heavy-duty suspension rails for easy access. In conjunction with the ARC-27 Automatic Remote Control, a complete diagnostic center is provided.

FMQ Control Panel

Status and Local Control

Just a single glance gives you a complete picture of the transmitter's operational status. The Local Control section has color-coded pushbuttons to initiate an operator sequence. As the operational condition changes, the result is displayed by illuminated color-coded status lamps. Interlock status is identified by clearly marked red LED indicators.

Metering

Eleven meters provide full monitoring of the Driver and Final Power Amplifier stages. These include PA plate voltage and plate current of both the Driver and Final Power Amplifier sections displayed on four dedicated meters. Both sections also include a scale meter to indicate forward/reverse power output, as well as grid current. Multimeters on both sections check additional parameters, including AC line and control ladder voltages. In the Driver cabinet, an IPA meter monitors the selectable operating voltage, current, forward/reverse power from the exciter, as well as forward/ reverse power from the IPA to the Driver's power amplifier. The Power and Control cabinet includes the circuit breaker panel and also includes an RF meter to monitor forward/reverse power input to the Final Power Amplifier and forward/reverse power output to the load. Filament voltage is metered in the Power Amplifier cabinet. Additionally, an elapsed time meter keeps track of PA tube filament hours.

Fault Annunciator

Covers the following conditions:

- IPA overvoltage or overcurrent
- Driver PA and Final PA grid or plate overcurrent
- VSVR exceeds factory preset limit
- Over temperature
- Power line phase fault

If at any time, any of these faults should occur, the appropriate descriptive block will light on the Fault Annunciator Panel in either the Driver or Power and Control Cabinets.

Mechanical

The FMQ-20000 and FMQ-30000 transmitters are housed in three interconnecting heavy-duty steel cabinets. Twelve-gauge steel reinforces the cabinet bases where heavy power supply components are mounted. The control panels are mounted across the front of the cabinets for operator convenience when taking readings. Above the exciter in the Driver cabinet is "NO1's" of available rack space, which can be used for auxiliary equipment (e.g. an STL receiver) eliminating the need for an additional rack cabinet.

Rear doors allow access to those portions of the transmitter not accessible from the front. A high pressure blower provides cooling for the Power Amplifier cabinet. Fans in each of the other cabinets provide positive pressure, thus minimizing dust infiltration. The transmitters and their operator are protected from dangerous operating conditions by door, air pressure, and safety interlock switches and an interlocked grounding stick is provided.
FM 20 KW - 30 KW
FM Broadcast Transmitters

**SPECIFICATIONS**

**Electrical and Mechanical**

- **AC Power Requirements**: 208-240 VAC, 3-phase, 50/60 Hz
- **Single phase power supply optional**
- **Power Consumption FMQ-20000**: 35 kW @ 20 KW RF Out
- **Power Consumption FMQ-30000**: 50 kW @ 30 KW RF Out
- **Dimensions - Driver Cabinet**: 24"W x 26"H x 30"D (61 cm x 193 cm x 76 cm)
- **Dimensions - Power and Control Cabinet**: 24"W x 26"H x 30"D (61 cm x 193 cm x 76 cm)
- **Weight - Driver Cabinet (FMQ-20000)**: 850 lbs. (386 kg)
- **Weight - Driver Cabinet (FMQ-30000)**: 930 lbs. (423 kg)
- **Weight - Power and Control Cabinet**: 1200 lbs. (545 kg)
- **Weight - Power Amplifier Cabinet**: 600 lbs. (295 kg)

**Controls and Status Indicators**

- **Driver Cabinet**
  - **Local Control Pushbuttons**: Off, Fil, On / H.V., Off, RF On - H.V. / LocalRemote switch
  - **Status Indicators**: Line Ready; Fil, On; H.V., Ready; Low Power, H.V., On
  - **Interlock Indicators**: Air, Temp, Meter Panel; Front Panel; Rear Door; PA Rear Cover; Aux.
  - **Metering/Switches**: Multimeter; 4 Function Pushbuttons
  - **PA Metering**: 9 Function Pushbuttons
  - **PA Plate Voltage**: 1200 VAC, 3-Phase, Motorized.
  - **PA Grid Current**: Switchable to: Forward and Reversal RF Power Output
  - **PA Input Tune and Load**: Knobs; direct connection to tune and load capacitors
  - **PA Output Tune and Load**: Motorized, with 3 position momentary switches (center off)
  - **RF Output Power**: 3 position Raised/Lower switch, center off
  - **Auto Remote Control**: Knob; Indicators and LCD Panel - Supplied with ARC-27 Remote Control

- **Low-Front Panel**
  - **Filament Voltage Adjustable**: High Voltage, PA (-45V) and Filament Circuit Breakers; Filament Hour Meter; Sample, Blower, and Control Fuses

- **Power and Control Cabinet**
  - **Circuit Breaker Panel**: PA Blower; Driver; PA Film, H.V.; FL12-13 Fuses
  - **Status Indicators**: Line Ready; Air; Front Panel; Rear; Aux.
  - **Metering/Switches**: Multimeter; 4 Function Pushbuttons
  - **RF Metering**: 4 Function Pushbuttons
  - **PA Plate Voltage Meter**: PA Plate, Over Current; Over Temp; Input VSWR
  - **PA Grid Current Meter**: PA Grid, PA Plate, Over Current, Over Temp; Input VSWR; Output VSWR; Phase Fault

- **Power Amplifier Cabinet**
  - **Tune and Load**: Match PA tube output to RF load
  - **Filament Voltage Meter**: Filament Hour Meter

**Performance**

- **Power Output FMQ-20000**: 10-20 KW
- **Power Output FMQ-30000**: 10-30 KW
- **Frequency Range**: 875 to 108 MHz
- **Frequency Selection (Synthesizer)**: 100 kHz Steps
- **Output Impedance Connector**: 50 Ohms, 3" 18E IIA
- **Stability vs. Temperature**: +200°C, -0.5°C
- **Distortion (THD)**: 0.05%
- **Transmit Intermod. Dist. (TIM)**: 0.025%
- **Incidental AM**: At least -50dB
- **FM Noise**: Better than -75dB
- **AM Noise**: Better than -150dB
- **Harmonic Suppression**: At least -80dB
- **Spurious Suppression**: All states
- **Mono Input**: 40 dBm @ 600 Ohms
- **Stereo Input**: 3.5 V, p-p @ 10 K Ohms
- **SCA Input**: 3 V, p-p @ 10 K Ohms

**Options**

- **ARC-27 Microprocessor-based Automatic Remote Control**
  - For wire connection
  - For STL connection
  - Order option 01
  - Includes option 03 - 695 Exciter replacing 675 Exciter
- **Four extra remote control channels for user-defined purposes**
  - Order option 02
- **Model 695 Exciter**
  - (Replaces Model 675 Exciter)
  - Order option 03
- **Terminal Control Package**
  - Order option 06

**Single Phase Power Supply**

- **Order FMQ-SPS**

For more information on the QEI 695 Exciter, and ARC-27 Automatic Remote Control, and the FMQ-1000 and FMQ-3500 transmitters, which function as the driver stages of the FMQ-20000 and FMQ-30000 respectively, please refer to our separate brochures covering each unit.

**QEI Corporation**

One Airport Drive / PO. Box D / Williamstown, NJ 08094 (609) 728-2020 / Toll Free (800) 334-9154 / Telex: 510-686-9402

FMQ 2020-047 SH
GENERAL
The 695 is an advanced technology FM excitier with outstanding features and performance. It is designed for unparalleled transparency in the transformation of program material to an FM signal. Noise and distortion of all kinds are reduced to a point that becomes difficult to measure. Many features that will appeal to the forward-looking broadcaster are incorporated into the 695 and supplied as standard.

The 695 will operate with any stereo generator or SCA generator (as well as a 600 ohm balanced line for monaural signals. High performance standards plus an array of operating features make the 695 truly Transparent Plus. As part of a QEI transmitter or as an upgrade for an existing transmitter, the 695 will make your station a leader in quality sound for years to come.

SUPER LOW DISTORSION
There is no "pre-distortion" network in the 695. QEI does not believe that a design should add distortion in hope of compensating for built-in distortion. Our design staff simply did it right and came up with an ultra-linear FMO that is virtually distortion free.

What's more, the 695 will not only maintain its almost distortion-free profiles in an engineering basement but will do it in your transmitter over a wide temperature range and under normal station operating conditions!

The Frequency Modulated Oscillator (FMO) is the "heart" of any excitier. With considerable design effort, QEI has achieved the optimum linearity for an FM excitier. While specifying a distortion level of .025%, a typical 695 will be on the order of .010% or better.

Shielding and acoustical insulation of this unique circuitry allow the 695 to maintain a high performance standard while installed in a heat-generating transmitter with a high-vibration blower and a multitude of stray electromagnetic fields.

COMPLETE TEST AND MONITORING FACILITIES
An extremely linear calibrated demodulator is included in the 695. The front panel meter will indicate either positive or negative total modulation with FCC specifications. This feature provides an accurate total modulation measurement with modulation peaks over 100% digitally displayed in a separate window.

Demodulated audio is also displayed by a color-coded bar graph with 5% increments. During normal modulation (50-100%), the bar graph operates in a green area or a yellow area if below 50%. Should the modulation exceed 100%, the bar graph will move into a red area. Additionally, the graph has a short-term memory that holds the highest peak occurring within an internally timed one-minute interval.

RF sampling for the demodulator can be obtained from the output of the 695 excitier or from the output of the transmitter.

"AUTOMOD" The "Automod" circuitry is an outgrowth of QEI's pioneering design efforts in Automatic Transmission Systems. This unique circuitry provides a precise form of Automatic Modulation Control that will maintain an optimum modulation level in spite of variations that may occur in the studio equipment or STL. Additionally, the modulation control is not temperature sensitive and will remain both accurate and effective over a wide range of environmental conditions.

The "Automod" circuitry actually samples the demodulated RF signal and precisely adjusts deviation to a pre-set modulation level.

PHASE-LOCKED LOOP SYNTHESIZER
QEI designed and built the first commercially available synthesized FM broadcast FMO in 1974. Shortly thereafter QEI began to manufacture the 675 FM excitier that was quickly adopted and labelled by several prominent transmitter companies.

With the introduction of the 695, QEI has again made significant advances in FM excitier technology. The 695 uses a new phase-locked loop circuit that provides lock in milliseconds from the time power is applied. RF frequency is selectable in discrete 100 kHz steps (10 kHz optional) that may be changed easily in the field without retuning. The 695 does not require an oven to maintain frequency stability over wide temperature ranges.

MICROPHONICS No longer will tapping a pencil on the excitier's front panel sound like thunder on the radiated signal. Techniques developed for QEI's 675 excitier have been improved for the 695 so that microphonics are an aggravation of the past.

FAULT ANNUNCIATOR A Fault Annunciator Panel will identify any of six major sections of the 695 that, in the unlikely event, should malfunction.

SPECTRUM ANALYZER OUTPUT This feature is derived from QEI's famous 691 FM Modulation Monitor. By simply connecting an oscilloscope to front panel XY BNC jacks, a ±120 kHz spectral display can be observed. By use of a built-in crystal-derived 32 kHz sine wave, a Bessel Null function calibration can be performed on the modulation monitoring system. Occupied bandwidth can also be observed.

BROADBANDED DESIGN Utilizing broadband amplifier circuitry throughout, the 695 requires no tuning or adjustment after it leaves the factory. Field tuning to a new frequency just means changing the synthesizer frequency.

CONSTANT POWER OUTPUT The 695 maintains a continual check of its output power and through a feedback loop will adjust its power output to remain at a pre-set point. The output power of the 695 can be set adjusted from 5 to 20 watts.

OTHER FEATURES The 695 lies into any FMD series diagnostic circuitry, providing key parameter measurements on the transmitter's diagnostic display.
### GENERAL PERFORMANCE

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Output</td>
<td>5 - 20 watts</td>
</tr>
<tr>
<td>Output Impedance</td>
<td>50 ohms</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>87.5 - 108 MHz</td>
</tr>
<tr>
<td>Frequency Selection</td>
<td>100 kHz steps (10kHz steps optional)</td>
</tr>
<tr>
<td>Operating Temp. Range</td>
<td>0° to +50° C</td>
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<tr>
<td>Frequency Stability</td>
<td>±200 Hz</td>
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<tr>
<td>AM Noise</td>
<td>at least -55 dB</td>
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<tr>
<td>Harmonic Suppression</td>
<td>at least -73 dB</td>
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<tr>
<td>Spurious Suppression</td>
<td>at least -90 dB</td>
</tr>
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</table>

### WIDEBAND (COMPOSITE) PERFORMANCE

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermodulation Distortion (60 Hz/7 kHz: 4/1)</td>
<td>0.25% Max.</td>
</tr>
<tr>
<td>Total Harmonic Distortion</td>
<td>0.25% Max.</td>
</tr>
<tr>
<td>Transient Intermod. Distortion (TIM)</td>
<td>0.25% Max.</td>
</tr>
<tr>
<td>Frequency Response Amplitude</td>
<td>±0.1 dB (30 Hz - 75 kHz)</td>
</tr>
<tr>
<td>Phase</td>
<td>±1° (30 Hz - 75 kHz)</td>
</tr>
<tr>
<td>FM Noise</td>
<td>at least -75 dB</td>
</tr>
<tr>
<td>Stereo Separation Capability</td>
<td>60 dB</td>
</tr>
<tr>
<td>Input (1)</td>
<td>3.5 Vp-p into 10k ohm</td>
</tr>
<tr>
<td>SCA Input (3)</td>
<td>1.0 Vp-p into 10k ohm (for 10% injection)</td>
</tr>
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</table>

### MONOaural Performance

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Intermodulation Distortion</td>
<td>0.25% Max.</td>
</tr>
<tr>
<td>Total Harmonic Distortion</td>
<td>0.25% Max.</td>
</tr>
<tr>
<td>Transient Intermod. Distortion</td>
<td>0.25% Max.</td>
</tr>
<tr>
<td>Audio Frequency Response Amplitude</td>
<td>±0.5 dB (30 Hz - 15 kHz)</td>
</tr>
<tr>
<td>Audio Input</td>
<td>±10 dBm into 600 ohms</td>
</tr>
<tr>
<td>FM Noise (de-emp)</td>
<td>at least -75 dB</td>
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### ELECTRICAL AND MECHANICAL

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Power Requirement</td>
<td>120/240 VAC, 50/60 Hz</td>
</tr>
<tr>
<td>Size</td>
<td>5.25&quot; H. x 19&quot; W. x 12&quot; D. (13.3 x 48.3 x 30.5 cm.)</td>
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<tr>
<td>Net Weight</td>
<td>32 lbs. (14.5 Kg.)</td>
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<tr>
<td>Shipping Weight</td>
<td>38 lbs. (17.3 Kg.)</td>
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<tr>
<td>Front Panel Finish</td>
<td>Black and Brushed Aluminum</td>
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### OPTIONAL ACCESSORIES

<table>
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<tr>
<th>Accessory</th>
<th>Value</th>
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<tbody>
<tr>
<td>Stereo Generator</td>
<td>772F</td>
</tr>
</tbody>
</table>

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**TRANSPARENT PLUS**

**FM Broadcast Exciter**

- Extremely low distortion...less than .025% independent of temperature.
- "AUTOMOD" automatic modulation control.
- Modulation metering and peak counter built in.
- Broadband design eliminates adjustments and tuning.
- Microphonoics virtually eliminated.
- 5 to 20 watts output.
- Synthesized phase-locked loop design...100 kHz steps. 10 kHz optional.
- Convection cooled...no fan or blower.
- Extensive metering, annunciator panel and bar-graph modulation display.
- Spectrum display output permits Bessel-null calibration of modulation monitoring.
- Very low noise.

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**QEI 695**

**QEI**

QEI endeavors an ongoing program of research and development to improve the finest product performance and quality. These specifications are therefore subject to change without notice.

QEI CORPORATION

One Airport Drive/ P.O. Box D/Williamstown, NJ 08094/(609) 728-2020 Toll Free (800) 334-9154/ Telex 510-686-9402
Features

- All Solid State
- New Super-Low Distortion Exciter
- Operational in One Second
- Remote Control Unit is Included
- New “Automod” Automatic Modulation Control and Automatic Power Control Built-In
- Automatic Transmission System (ATS) Built-In
- Solid-State Relay Control Logic with Manual Back-Up
- Factory Computer Fault Analysis... by Telephone
- Microprocessor Based Diagnostics Reads Over 50 Parameters
- Any Number of Alarm Points Can be Pre-Set on Any Parameter
- Full Remote Control Operation with 14 Raise-Lower Points
- Printer Option Provides AutoLog Facility Meeting All FCC Logging Requirements
- Five External Commands and Six Status Points Option
- Low-Pass Filter and Directional Coupler Mounted Inside the Cabinet
- Automatic Re-Cycle
General

The 695T1KW is a new, advanced-technology transmitter and offering a myriad of features made possible only by introducing recent technological advances to FM transmitter design. The 695T1KW's design blends microprocessor technology with QEI's expertise in solid-state transmitters, control systems (ATS), and FM modulation monitors.

Features herefore not available in FM transmitters are built into the 695T1KW. Alarm points on important parameters will warn you before a catastrophic failure occurs. Automatic Power and Modulation Control or ATS are available at the flick of a switch; ideal for stations with satellite feed or those that are heavily automated.

As a primary transmitter or as an "Instant On" back-up, the 695T1KW is conservatively designed to provide years of trouble-free service with a quality of sound not available in earlier design of FM transmitters.

New 695 Exciter

Features and performance are the hallmarks of this new, super-low distortion, exciter. The 695 employs a phase-locked-loop (PLL) oscillator for frequency stability, special varicap circuitry for superlative linearity that does not vary with temperature and broadband amplifiers for ease of tuning and ruggedness. All key operating parameters are tied into the transmitter's diagnostic system and can be read on both the Remote Control Unit and the control panel.

The modulation percentage is visually displayed on the front panel using a three color LED bar-graph presentation. Typical distortion levels are less than .01% and the TIM* is so low that it is virtually unmeasurable. Even microphonics are an aggravation of the of the past as QEI's 695 has effectively eliminated them. As an added feature a switchable Automatic Modulation Control ("Automod") is built into the 695 increasing its versatility and value. The 695 also displays (LED) the modulation peaks over 100%.

All these features with a truly transparent design add up to the 695...An exciter that is transparent-plus.

Intermediate Power Amplifier (IPA)

The all solid-state IPA supplies up to 160 Watts of drive to the power amplifier. The circuitry is an outgrowth of over six years of QEI expertise in solid-state FM transmitters.

The IPA section contains 3 bipolar transistors, each with its own protective circuitry. Both the input and output power are continuously monitored and the variable attenuator between the exciter and IPA is automatically adjusted to insure the transmitter's RF output remains precisely at its pre-set level.

Complete access to the IPA is provided by lowering the IPA front panel. The IPA may be completely removed from the transmitter by removal of 5 front panel screws and disconnecting two connectors.

The Power Amplifier

The all solid-state power amplifier (PA) consists of eight (8) bipolar transistors arranged in a paired-parallel configuration. A splitter-combiner divides the output of the IPA between two separate 500 watt modules each having four (4) transistors. The output of these modules are then combined and fed to an internally mounted low pass filter and directional coupler.

Each transistor is protected from an overcurrent condition which could result from component failure or overdrive. The power amplifier will drop to 40% of its output power should the VSWR exceed a pre-set level (usually 1:1.6). At 400 watts RF output, the amplifier can operate into a severe mismatch.

All PA parameters are metered on the control panel including forward and reflected power. The PA is accessible from the front panel by loosening four (4) quick release fasteners.

Solid-State Power Amplifier Module

Control and Overload Recycling System

A unique, redundant, relay control system is used. It operates on solid-state microprocessor logic but in the event of system failure the basic control functions can be initiated manually and sequencing reverts to electro-mechanical logic.

Any sustained interruption in primary power, an abnormal VSWR or an IPA/PA overload will cause the transmitter to drop to its low power position or completely shut down. The system will make 3 attempts to re-establish full power output but if the condition has not cleared, the transmitter will remain at low power or completely close down depending on the severity of the problem.

A "memory" feature maintains the transmitter in a power position in the event of momentary loss of AC power. If the power loss continues then the transmitter will revert to a normal restart cycle.

*=Transient Intermodulation distortion.
The Control Panel

The control panel presents the station operator with unparalleled test, monitor and control possibilities. Functions and controls are logically grouped and clearly identified for the operator's convenience.

Status and Local Control

Complete operational status of the transmitter can be determined in a single glance. The Local Control section uses 4 self-identifying push-buttons to initiate an operational phase. As the operational condition changes the results are displayed by an illuminated color coded, status lamp.

Diagnostic Center

The built-in keypad allows selection of up to 52 internal and external (optional) parameters. These are then displayed in their actual value on a large, backlit LCD. The raise-lower functions are indicated by a directional arrow on the display when the raise-lower switch is activated. In the event that any pre-set alarm points are exceeded, a red LED will light and remain on until the alarm view button is pressed. Once pressed the LCD will display the alarmed parameter and indicate the time of its occurrence. More than one alarm, if present, can be viewed sequentially by simply repeated pushing of the alarm button. This procedure cancels the viewed alarm. The required FCC parameters for 3 hour logging can easily be displayed, on the LCD along with the time, by selecting the right keypad code.

Metering

Five meters are used for PA and IPA monitoring. The PA collector voltage and total collector current meters are dedicated and are used in conjunction with the PA tune and load switches. Reverse/forward PA power output is read from a separate meter. The IPA meter monitor 17 selectable points including all individual IPA and PA collector currents. Multimeter checks four additional switch selectable parameters.

Fault Annunciator

Any time the IPA or PA is in an overvoltage or overcurrent condition or if the VSWR limit of the transmitter has been exceeded, the appropriate descriptive block (there are six) lights up on the Fault Annunciator Panel.

Remote Point Monitoring and Factory Assistance

By simply attaching a pair of phone wires to the 695T1 KW's telephone modem the transmitter will advise a remote CRT, teleprinter or any computer system that will accept an RS-232 plain language format, of an alarm condition and permit parameter interrogation. An acoustical coupler is also available where a hard-wire connection cannot be used.

Factory computer definition of a fault, or a review of the transmitter's operating parameters, can be obtained in the same manner by calling the factory. This service is available at no charge to the transmitter purchaser for the lifetime of the transmitter. Additionally, a special computer maintenance program (that will provide a detailed fault analysis) is available to consultants.

The Automatic Transmission System (ATS)

Designed to control the modulation level, RF power output and the ON-OFF functions of the transmitter, the ATS is self checking (once every minute) and will operate with the Remote Control Unit over an STL or a voice grade telephone line.

The ATS allows the station to dispense with meter logging every 3 hours and reduce weekly maintenance checks to once a month.

An RF demodulator is built into the system eliminating the need to interface with an external modulation monitor. The modulation level is controlled at the composite output of the STL or stereo generator thus eliminating phase crosstalk and separation degradation.

Any ATS recognized alarm will be displayed on the control panel and at the Remote Control Unit. Should the out-of-tolerance condition not be corrected by the ATS within 3 consecutive minutes, an audible alarm will sound.

Although the Remote Control

Unit is the prime control point, additional alarm points can be added using only a voice grade line. The ATS complies with all applicable FCC rules and regulations.

ATS Indicators

Exact parameter displayed on LCD
(Over/under modulation over/under RF power)
Data Presence
System check at Transmitter
Control Presence
System check at the RCU
ATS Warning
Occurs 30 seconds before shutdown
FailSafe
Transmitter Shutdown
Warning Tone
At RCU Only (at shutdown)
Mechanical

The 695T1KW is self-contained in a modern, heavy-duty steel cabinet. The base of the cabinet is reinforced #12 gauge steel on which the heavy power components are mounted. The control panel, mounted across the center of the cabinet, swings down for complete accessibility. A rear door allows access to portions of the transmitter not accessible from the front. A rear door mounted blower maintains a positive air pressure inside the cabinet during operation. The transmitter is protected from dangerous operating conditions by door, temperature and air-pressure safety interlock switches.

The Remote Control Unit (RCU)

The RCU is standard and supplied with the transmitter. It provides all the operating facilities available at the transmitter's Control Panel in a space efficient manner.

Diagnostics, status, alarms, and raise/lower parameters are displayed and handled in the same manner as on the transmitter's Control Panel. Additionally, the FCC's required logging parameters are automatically displayed on the LCD when the keypad door on the RCU is closed.

The ATS is a function of the RCU. The audible ATS alarm and the ATS enable/disable switch are located on the Remote Control Unit's front panel.

The RCU will operate over standard voice grade telephone lines or an STL.

Specifications

<table>
<thead>
<tr>
<th>Performance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Output</td>
<td>1000 Watts</td>
</tr>
<tr>
<td>Frequency Range</td>
<td>87.5 to 108 MHz</td>
</tr>
<tr>
<td>Frequency Selection (Synthesizer)</td>
<td>100 KHz steps</td>
</tr>
<tr>
<td>Output Impedance/Connector</td>
<td>50 ohms 1/8&quot; EA</td>
</tr>
<tr>
<td>Stability vs Temperature</td>
<td>± 200 Hz (0° C)</td>
</tr>
<tr>
<td>Distortion (THD)</td>
<td>0.025% (0° C)</td>
</tr>
<tr>
<td>Distortion (IM)</td>
<td>0.25% (0° C)</td>
</tr>
<tr>
<td>Transient Intermod. Dist. (TIM)</td>
<td>0.25% (0° C)</td>
</tr>
<tr>
<td>FM Noise</td>
<td>at least -75 dB</td>
</tr>
<tr>
<td>AM Noise</td>
<td>at least -55 dB</td>
</tr>
<tr>
<td>Mono Input</td>
<td>+10 dBm, 600 ohms</td>
</tr>
<tr>
<td>Stereo Input</td>
<td>3.5 Vp-p, 10k ohms</td>
</tr>
<tr>
<td>SCA Input</td>
<td>1 Vp-p (for 10k ohms), 10k ohms</td>
</tr>
</tbody>
</table>

Electrical and Mechanical

AC Power Requirement*      | 208-240 VAC, 50/60 Hz |
Power Consumption            | 2.0 kW |
Dimensions                   | 24" W x 16" H x 30" |
|                             | (61 X 193 X 76 cm) |
Weight                       | 650 lbs. |

Remote Control Unit

Functions

- Diagnostics (52 parameters) By keypad
- Raise-Lower Functions 14
- Dedicated Controls Hi or Low Power, On or Off

Display

- Alarm Indicator (Yellow) LED
- Control Indicator (Green) LED
- Data Indicator (Green) LED
- LCD (illuminated) Status, alarms or call-ups
- ATS Warning (Yellow) LED
- ATS FailSafe (Red) LED
- High or Low Power 2 x LED (Yellow - Red)

Status Read-out (LCD)

- Vc, L calculated indirect power & time

Alarms

- Visual Up to 9 alarms on each parameter
- Audible ATS-Sanalert (switchable)

Automatic Transmission System (ATS)

- Selectable on/disable switch
- Parameters Monitored 8 (see ATS desc.)

Dimensions

- 5 1/4" H x 19" W x 12" D
- (13.3 X 48.3 X 30.5 cm)

Accessories & Options

- Stereo Gen. 772F
- SCA Gen. 811
- External Status & Control Coupler AC-1
- Interface XM-6 CRT ADM-5
- FCC Autologger PRT-1

*Other power inputs available on request.

QEI Corporation
One Airport Drive / P.O. Box D / Williamtown, NJ 08094
(609) 728-2020

*These specifications subject to change without notice.

Form No: 959 KW (DD8)
FM BROADCAST TRANSMITTER
MODEL 675T150

features

- State of the art 100% solid state circuit.
- F.C.C. type accepted.
- Power output adjustable from 100 to 150 watts.
- V.S.W.R. protected.
- Separate meters for monitoring PA parameters.
- On-carrier direct FM modulation.
- Programmable phase locked loop frequency synthesizer.
- +10dbm audio line level required for full modulation.
- Stereo capability with QEI Model 772 Stereo Generator.
- SCA capability with QEI Model 811 SCA Generator.
- Compatible with QEI Model 7775 Automatic Transmission System.

description

The 675T150 uses a conservatively rated power transistor in the output stage. A driver transistor is used to allow an exciter of 10W output to drive the final stage to 150W. The unit is convection cooled for maximum reliability. The power supply is current limited to prevent the output stage from drawing excessive current during severe mismatch conditions. In addition to current limiting protection, a V.S.W.R. protection circuit is incorporated to reduce the input to the final stage under mismatch conditions.

The 675T150 Amplifier is available separately. RF drive power required is 10 watts. Order 675T150A.
electrical specifications

Frequency Range .......... 88MHz to 108MHz (Programmable)
Power Output .................. Adjustable 100-150 watts
Type of Emission ............... 180F3 or 300F9
Modulation Capability ......... 150KHz Peak Deviation (less than 1% THD)
Frequency Stability .......... ±300Hz (-10°C to +55°C)
Output Impedance .......... 50 ohms, type N Jack (female)
VSWR Protection ............... any magnitude or phase
Harmonic & Spurious
  Suppression ................. better than 70db
Audio Frequency Response .... ±1db (50Hz - 15KHz, 75 usec pre-emp)
Audio Distortion ............. 0.25% max. THD @ 75KHz deviation
FM Noise ...................... better than -70db (below 75KHz dev. with 75usec de-emp)
AM Noise ...................... better than -60db
Stereo Separation ............ better than 40db from 30Hz - 15KHz with Model 772 Stereo Generator
Crosstalk (Main to SCA) ......... -55db
Crosstalk (SCA to Main) ......... -65db
Mono Input
  Impedance ................. 600 ohms (balanced) barrier strip screw connection.
  Level ...................... +10dbm for 100% modulation (75KHz deviation)
Pre-emphasis ................. 75usec (50usec optional)
Stereo Input
  Impedance ................. 10K ohms, BNC Female Connector
  Level ...................... 3.5Vpp for 100% modulation (75KHz deviation)
SCA Inputs (2)
  Impedance ................. 10K ohms, BNC Female Connector
  Level ...................... 1Vpp for 10% Injection

mechanical specifications:

Dimensions:
Exciter .......................... 3½"H X 19"W X 14"D
Power Amplifier .................. 7"H X 19"W X 17"D
Environmental .................. 122°F (50°C) Ambient
Primary Power .................. 115/230Vac., 50/60 Hz, 300 watts max.

optional equipment

A remote control package is available. This option includes
PA voltage and current samples, momentary closure on/off
function and a motor driven power control. Order 675T150R.

QEI CORPORATION
One Airport Drive, P.O. Box D
Williamstown, N.J. 08094
(609) 728-2020

Representative
FM BROADCAST TRANSMITTER
MODEL 675T300

features
- FCC Type Accepted
- State of the art 100% solid state circuit
- Power output adjustable from 150 to 300 watts
- VSWR protected
- Separate meters for monitoring PA parameters
- On-carrier direct FM modulation
- Programmable phase locked loop frequency synthesizer
- +10dBm audio line level required for full modulation
- Stereo capability with QEI model 772 Stereo Generator
- SCA capability with QEI model 811 SCA Generator
- Compatible with QEI model 7775 Automatic Transmission System

description
The 675T300 uses two conservatively rated power transistors in the output stage. A driver transistor is used to allow an Exciter of 20W output to drive the final stage to 300W. The unit is forced air cooled for maximum reliability. The power supply is current limited to prevent the output stage from drawing excessive current during severe mismatch conditions. In addition to current limiting protection, a VSWR protection circuit is incorporated to reduce the input to the final stage under mismatch conditions.

The 675T300 Amplifier is available separately. RF drive power required is 10 watts. Order 675T300A.
electrical specifications

Frequency Range .88 MHz to 108 MHz (Programmable)
Power Output ..................Adjustable 150-300 watts
Type of Emmission ..............180F3 or 300F9
Modulation Capability .........150 KHz Peak Deviation
(less than 1% THD)
Frequency Stability ..........±300 Hz (-10°C to +55°C)
Output Impedance ..............50 ohms, type N Jack (female)
VSWR Protection ...............any magnitude or phase
Harmonic & Spurious Suppression..better than 70dB
Audio Frequency Response ...±1 db (50 Hz - 15 KHz,
75 usec pre-emphasis)
Audio Distortion 0.25% max. THD @ 75 KHz deviation
FM Noise ...................better than -70dB (Below 75 KHz deviation
with 75 usec de-emphasis)
AM Noise .....................better than -60dB
Stereo Separation Better than 40dB from 30 Hz - 15 KHz
with Model 772 Stereo Generator
Crosstalk (main to SCA) .........-55dB
Crosstalk (SCA to main) .........-65dB
Mono Input
Impedance ......................600 ohms balanced, barrier strip
Level .....................+10dBm for 100% modulation (75 KHz deviation)
Pre-emphasis .................75 usec (50 USEC optional)
Stereo Input
Impedance ..................10K ohms, BNC Female Connector
Level ................ 3.5 Vpp for 100% modulation (75 KHz deviation)
SCA Inputs (2)
Impedance .................10K ohms, BNC Female Connector
Level ..................1 Vpp for 10% injection

mechanical specifications

Dimensions:
Exciter ..........................3½" H x 19" W x 14" D
Power Amplifier ..................10½"H x 19" W x 19" D
Maximum Operating Temperature ....122°F (50°C)
Primary Power 115/230 vac., 50/60 Hz, 600 watts max.

optional equipment

A remote control package is available. This option includes PA voltage and current samples, momentary closure on/off function and a motor driven power control. Order 675T300R.
Tuneable Stereo Modulation Monitor and FM Test Set
Model 691

FEATURES

- A complete proof-of-performance instrument for Mono, Stereo, and SCA measurements.
- Tuneable in 100 kHz steps over the entire FM band.
- Autoranging meters select correct meter operating range automatically.
- Converts a standard X-Y oscilloscope into a spectrum analyzer.
- Off-the-air or direct transmitter connection.
- Will accept up to 50 Watts of RF input with a suitable termination.
- Functional front panel layout with color coded groupings and unique over-under meter arrangement.
- Peak flashers adjustable from 1% to 199% with 100% peak counting digitally displayed.

- Vector display of stereo phasing with standard oscilloscope.
- Extremely low internal distortion.
- Composite input allows direct measurement at the outputs of the STL receiver, stereo or SCA generators.
- Over forty proof-of-performance and troubleshooting tests possible when used with an oscilloscope.
- Full one year warranty on all parts and labor.
- Built-in bessel null feature allows calibration verification.

QEI Corporation
Box D / Williamstown, NJ 08094
GENERAL
The 691 FM Monitor/Test Set is a high technology, precision instrument employing a combination of new techniques in a single, highly versatile, but very compact package. It was designed to be a complete FM test package with facilities for all proof-of-performance measurements and a wide range of trouble-shooting tests. Operator convenience and simplicity of use were primary considerations in the design of the 691. Component selection and device ratings are such as to enhance the instruments reliability even with adverse handling. The 691 occupies only 10 1/2" of vertical rack space in a standard 19" rack.

FRONT PANEL CONVENIENCE
A color coded grouping system ties together the associated meters, switches, indicators and jacks for a particular test or function. This coupled with the autoranging metering and front panel indicators minimize operator error. Adding to these ease-of-operation features is the simple but effective device of mounting the L and R meters vertically thus eliminating the "Ping-Pong" type of eye movements necessary for horizontally mounted meters. Both of the 691's meters are easily tracked in a single glance.

EASY-TO-OPERATE
In addition to the functional color coding a number of features are incorporated into the 691 that simplify operation and maximize accuracy. The RF input level is monitored and the signal level displayed by 3 LED's (Hi-Lo-OK). Calibration can be verified from the front panel. A single row of push-buttons simultaneously select both A and B displays of the two autoranging meters. All primary test outputs are available on the front panel (BNC jacks). The signal inputs and secondary outputs are located on the rear panel.

Color coded lamps indicate pilot and/or sub-carrier presence. A warning LED illuminates should the local oscillator become unlocked.

The operating frequency and peak flashers are set by use of rugged thumb wheel switches to assure positive contact and minimize setting error.

Monitor pilot phase may be matched to stereo generator pilot phase in the presence of modulation.

TEST SET FLEXIBILITY
The built-in signal sampler allows the 691 to function as a self-contained exciter test set. Any exciter of less than 50 watts output may be directly connected to the RF input thereby eliminating the requirement and expense of external signal samplers.

All required frequency outputs are available at a single (switchable) front panel, BNC connector.

The front panel outputs of the test meters allow quick and easy oscilloscope comparison of channel A and channel B content when making separation, cross talk, or noise measurements.

The null setting for stereo generator (19 kHz-38 kHz) phase increases accuracy and reduces test equipment set up time.

FM noise and AM noise measurements are made automatically without the need to preset reference levels.

The 691 comes complete with a six element yagi antenna for off air monitoring eliminating the need for an additional RF amplifier.

SOME 691 TESTS POSSIBILITIES

<table>
<thead>
<tr>
<th>Total Modulation (%)</th>
<th>Signal-to-Noise:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left or Right Modulation (%) and Peaks</td>
<td>Unweighted left, right or main channel</td>
</tr>
<tr>
<td>Total Peaks (0-199%)</td>
<td>De-emphasized left, right or main channel</td>
</tr>
<tr>
<td>Peaks Per-Minute (100%)</td>
<td>Stereo subcarrier weighted or unweighted</td>
</tr>
<tr>
<td>Pilot Level</td>
<td>SCA weighted or unweighted</td>
</tr>
<tr>
<td>Left, Right or SCA Peaks</td>
<td>Left, Right, SCA or Total</td>
</tr>
<tr>
<td>SCA Injection</td>
<td>Frequency Response</td>
</tr>
<tr>
<td>Crosstalk:</td>
<td>SCA Modulation Asymmetry</td>
</tr>
<tr>
<td>Main to Stereo Sub</td>
<td>Occupied Bandwidth*</td>
</tr>
<tr>
<td>Stereo Sub to Main</td>
<td>Stereo Phase (vector display)*</td>
</tr>
<tr>
<td>Main to SCA</td>
<td>Relative Signal Strength*</td>
</tr>
<tr>
<td>SCA to Main</td>
<td>AM or FM Noise</td>
</tr>
<tr>
<td>Stereo Sub to SCA</td>
<td>Stereo Generator Phase</td>
</tr>
<tr>
<td>SCA to Stereo Sub</td>
<td>*When used with an Oscilloscope</td>
</tr>
<tr>
<td>Stereo Separation</td>
<td></td>
</tr>
<tr>
<td>Left into Right</td>
<td>Multipath</td>
</tr>
<tr>
<td>Right into Left</td>
<td></td>
</tr>
</tbody>
</table>

*When used with an Oscilloscope
AUTORANGING TEST METERS
A "display-select" row of push-buttons choose seven (7) pair of different tests (14 total) to be displayed by the Autoranging Meters. Channel 'A' is displayed on the upper meter while Channel 'B' is displayed on the meter directly below it. Channel 'A' and 'B' meters will automatically select and indicate in the correct operating range for the level of signal under test. The operating range and unit of measurement is displayed directly to the left of its respective meter. The meters are individually switchable to display either positive or negative peaks. The autoranging feature can be defeated by a front panel switch which allows the meter to function with the ballistics specified by the FCC when these type of measurements are required. The de-emphasis network can be activated by a push-button switch conveniently placed to the left of the meter. AM noise and FM noise measurements automatically activate the de-emphasis network.

SPECTRUM ANALYZER AND VECTOR DISPLAY
The 691 provides two BNC jacks for an X-Y connection to an oscilloscope (not supplied with the 691). A front panel push-button selector enables the operator to view the occupied bandwidth of the transmitters signal with either a 240 kHz or 700 kHz display. The 240 kHz (narrow) spectrum analyzer display allows the operator to use bessel null functions to determine the absolute calibration accuracy of the 691 Monitor/Test Set. Additionally the phase relationship between the left and right channels may also be viewed on the oscilloscope as a vector display. This simplifies stereo phase adjustments and allows continuous monitoring of the phase relationship of an off-the-air signal.

PEAK FLASHERS AND COUNTERS
The total modulation peaks exceeding 100% in one minute time are counted and displayed. The total modulation flasher illuminates each time the level of modulation exceeds a predetermined level (adjustable from 0 to 199%). LED peak flashers, also adjustable, are used for channel A and channel B displays.

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Box D / Williamstown, NJ 08094

691 WHEN USED AS A SPECTRUM ANALYZER
PERFORMANCE SPECIFICATIONS

RF Frequency Range ................. 88.1 - 107.9 MHz (thumbwheel selected)

RF Input
Antenna .................................. 3.16mV to 80mV
Signal Sample ....................... 1mW to 50W (depending on external load)

Total Modulation Display (Modulation Meter)
Accuracy ................................ ± 2% entire range
Frequency Response .................. 0.2 dB 30 Hz - 75 kHz
Range .................................... 0-133% (-20 dB to +2 dB)
Ballistics ................................ per FCC regulations

Peak Indicators
Range ................................... 0-199% in 1% increments
Accuracy ................................ ± 1%

Peak Counter
Set Point .................................. 100% ± 1%
Time ...................................... 1 minute ± 1 sec

Distortion .............................. 0.05% THD or IMD
S/N ....................................... better than 75 dB (with 75 µSec de-emp)

Test Displays (2)
Meter Accuracy ....................... ± 2% entire range
Peak Indicator Accuracy ............ ± 1%
Pilot & SCA Injection Accuracy .... ± 0.5% (6% to 12%)

Separation
L into R or R into L ................... 55 dB

Crosstalk
Main into Sub ........................... 65 dB
Sub into Main ........................... 65 dB
SCA into Sub or Main .................. 70 dB
Pilot into Sub or Main ............... 70 dB

Monitoring Modes
1) Left ..................................... Right
2) Main .................................... Sub
3) Pilot Level ................................ Phase Cal
4) 38 kHz .................................. Gen. Phase
5) FMS/N .................................. AMS/N
6) SCA Inj. narrow ........................ Main
7) SCA Inj. wide .......................... SCA Mod.

Distortion (Left to Right)
THD ........................................ 0.05%
IMD ........................................ 0.1% (Smpte)
SCA (4 kHz dev.) ....................... 1% (50 Hz to 5kHz)
 ........................................... (150 µSec de-emp)

Outputs
Left ................................ + 10 dBm bal. and Hi-Z
Right ................................ + 10 dBm bal. and Hi-Z
Scope ................................ 1 Vp-p
Frequency ............................ X.O., I.F., Pilot, SCA

Spectrum Analyzer Output ........ 70 dB ± 120 kHz or ± 300 kHz
X (horiz.) .......................... 4 Vp-p
Y (vert.) .................................. 0.5 V/10 dB

NOTE: The QEI Model 691 is Type Approved for SCA use only with subcarriers in the range of 59 kHz to 75 kHz with injection of 10% or less.

MECHANICAL SPECIFICATIONS

Dimensions ................. 10½" H x 19" W x 12" D overall
........................................ (26.7 x 48.3 x 30.5 cm)

Shipping Weight ........... 32 lbs.
........................................ (14.54 kg.)

Maximum Operating Temperature
........................................ 122°F (50°C) Ambient

OPTIONS

Built-in SCA monitoring available
691/01 - Single SCA
691/02 - Dual SCA

NOTE: Specifications subject to change without notice.
GENERAL
The 691 FM Monitor/Test Set is a high technology, precision instrument employing a combination of new techniques in a single, highly versatile, but very compact package. It was designed to be a complete FM test package with facilities for all proof-of-performance measurements and a wide range of trouble-shooting tests. Operator convenience and simplicity of use were primary considerations in the design of the 691. Component selection and device ratings are such as to enhance the instrument reliability even with adverse handling. The 691 occupies only 10 1/2" of vertical rack space in a standard 19" rack.

FRONT PANEL CONVENIENCE
A color coded grouping system ties together the associated meters, switches, indicators and jacks for a particular test or function. This coupled with the autoranging metering and front panel indicators minimize operator error. Adding to these ease-of-operation features is the simple but effective device of mounting the L and R meters vertically thus eliminating the "Ping-Pong" type of eye movements necessary for horizontally mounted meters. Both of the 691's meters are easily tracked in a single glance.

EASY-TO-OPERATE
In addition to the functional color coding a number of features are incorporated into the 691 that simplify operation and maximize accuracy. The RF input level is monitored and the signal level displayed by 3 LEDs (Hi-Lo-OK). Calibration can be verified from the front panel. A single row of push buttons simultaneously select both A and B displays of the two autoranging meters. All primary test outputs are available on the front panel (BNC jacks). The signal inputs and secondary outputs are located on the rear panel.

Color coded lamps indicate pilot and/or sub-carrier presence. A warning LED illuminates should the local oscillator become unlocked. The operating frequency and peak flashes are set by use of rugged thumb wheel switches to assure positive contact and minimize setting error. Monitor pilot phase may be matched to stereo generator pilot phase in the presence of modulation.

TEST SET FLEXIBILITY
The built-in signal sampler allows the 691 to function as a self-contained exciter test set. Any exciter of less than 50 watts output may be directly connected to the RF input thereby eliminating the requirement and expense of external signal samplers. All required frequency outputs are available at a single (switchable) front panel, BNC connector.

The front panel outputs of the test meters allow quick and easy oscilloscope comparison of channel A and channel B content when making separation, cross talk, or noise measurements.

The null setting for stereo generator (19 kHz-38 kHz), phase increases accuracy and reduces test equipment set up time. FM noise and AM noise measurements are made automatically without the need to preset reference levels.

The 691 completes with a six element yagi antenna for off-air monitoring eliminating the need for an additional RF amplifier.

AUTORANGING TEST METERS
A display select row of push buttons choose seven (7) pair of different tests (14 total) to be displayed by the Autoranging Meters. Channel A is displayed on the upper meter while Channel B is displayed on the lower meter. The AM and FM displays are automatically selected and indicate in the correct operating range the level of signal under test. The operating range of the unit of measurement is displayed directly to the left of its respective meter. The meters are individually switchable to display either positive or negative peaks.

The autoranging feature can be defeated by a front panel switch which allows the meter to function with the ballistics specified by the FCC when these type of measurements are required. The de-emphasis network can be activated by a push-button switch conveniently placed to the left of the meter.

AM noise and FM noise measurements automatically activate the de-emphasis network.

SPECTRUM ANALYZER AND VECTOR DISPLAY
The 691 provides two BNC jacks for an X-Y connection to an oscilloscope (not supplied with the 691). A front panel push button selects enable the operator to view the occupied band-width of the transmitters signal with either a 240 kHz or 700 kHz display. The 240 kHz (narrow) spectrum analyzer display allows the operator to use the test null functions to determine the absolute calibration accuracy of the 691 Monitor Test Set.

Additionally the phase relationship between the left and right channels may also be viewed on the oscilloscope as a vector display. This simplifies stereo phase adjustments and allows continuous monitoring of the phase relationship of an off-the-air signal.

PEAK FLASHERS AND COUNTERS
The total modulation flasher illuminates each time the level of modulation exceeds a pre-determined level (adjustable from 0 to 100%). The total modulation peaks exceeding this level in one minute are counted and displayed. LED peak flashers, also adjustable, are used for channel A and channel B displays.

Model 691 When Used As A Spectrum Analyzer
### MECHANICAL SPECIFICATIONS

**Dimensions**
10 1/4" H x 19" W x 12" D overall (26.7 x 48.3 x 30.5 cm)

**Shipping Weight**
32 lbs.
(14.54 kg)

**Maximum Operating Temperature**
122°F (50°C) Ambient

### OPTIONS

- A complete proof-of-performance instrument for Mono, Stereo, and SCA measurements.
- Tuneable in 100kHz steps over the entire FM band.
- Autoranging meters select correct meter operating range automatically.
- Converts a standard XY oscilloscope into a spectrum analyzer for occupied bandwidth observations.
- Off-the-air or direct transmitter connection.
- Will accept up to 50 Watts of RF input with a suitable termination.
- Functional front panel layout with color coded groupings and unique over-under meter arrangement.
- Extremely low internal distortion.
- Peak flashers adjustable from 1% to 100% with digitally displayed peaks per minute.
- Vector display of stereo phasing with standard oscilloscope.
- Composite input allows direct measurement of the STL receiver, stereo or SCA generator output.
- Over forty proof-of-performance and troubleshooting tests possible when used with an oscilloscope.
- Built-in modulation calibrator.
- Built-in nessel null feature allows calibration verification.
- Full one year warranty on all parts and labor.