
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 3 1/2" 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 3 1/2" 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.



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

electrical specifications

Inputs (Right and Left)

- a) Frequency Range 30 Hz-15 KHz
- b) Impedance 600 ohms balanced
- c) Level +10dbm \pm 1 db

Frequency Response (30 Hz-15 KHz)

- a) Flat \pm 0.5 db
- b) Pre-emphasized 75usec \pm 1 db

Output (Composite)

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

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 \pm 1 Hz

Power Requirement 105-125Vac or 210-250 Vac
50/60 Hz

mechanical specifications

Dimensions 3 $\frac{1}{2}$ " x 19" x 12"D

Net Weight 6 lbs.

Shipping Weight 8 lbs.

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

optional equipment

Matched 15KHz 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
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Representative

FM EXCITER MODEL 675



features

- FCC Type Accepted
- 100% Solid State
- Phase Locked
- Frequency Synthesized
- Stability ± 300 Hz (0°C to 50°C) (3ppm)
- 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 $3\frac{1}{2}$ " 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 $3\frac{1}{2}$ " 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.



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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 $\pm 300\text{Hz}$ (-10°C to $+55^{\circ}\text{C}$)
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 $+10\text{dbm} \pm 1\text{db}$ (100% = 75 KHz dev)
3. Pre-emphasis 75usec $\pm 1\text{db}$ (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 QEI Model 772 Stereo Generator
Crosstalk (Main to SCA) -55db
Crosstalk (SCA to Main) -65db
Environmental 0°C to $+55^{\circ}\text{C}$ operating

See our companion Stereo Generator Model 772



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Representative

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 Reliables" line of FM transmitters, available in 1KW, 3.5KW, 5KW, 10KW, 15KW, 20KW and 30KW configurations.

The system consists of one or two ARC-27 Studio Units and a Transmitter Subsystem. For maximum flexibility, it operates over dedicated voice-grade telephone lines or STL/SCA, or a combination of the two. The system comes ready to go, complete with modem or STL/SCA generator/decoder.

The ARC-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 of low modulation, overmodulation, tower light failure, security breaches, fire, system interlock, and more.



ARC-27 Transmitter Subsystem

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 exciter Automod operation.



ARC-27 Studio Unit

Features

Dual-Mode Keypad Control

Both the Transmitter Subsystem and the ARC-27 Studio Unit provide quick access and control via a keypad,

as well as status LEDs and a plain English LCD display. At the transmitter site itself, the keypad provides control over all transmitter functions.

Two key-selectable control modes at the studio prevent accidental intervention by nontechnical personnel, while providing full access by engineers and technicians. With the keypad locked, nontechnical personnel have access only to the Transmitter On and Off pushbuttons and Power Raise and Lower control. A rear-panel jumper disables the Power Raise and Lower controls if desired. All functions are enabled for use by engineers with the turn of a key.



ARC-27 Studio Unit Controls and Display

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 generators, 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 3½" H x 19" W x 12" D

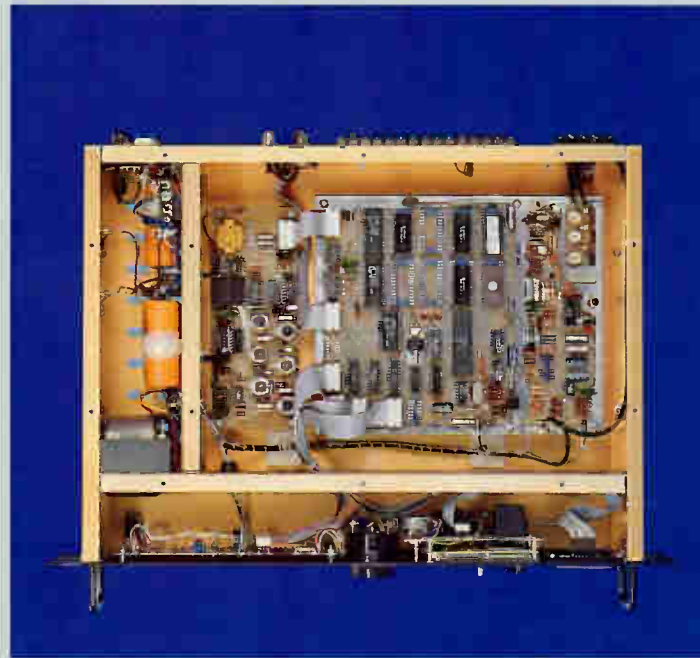
Weight 15 lbs.

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 Studio Unit-TopView



The New Reliables

ARC-27

Automatic Transmitter Remote Control System

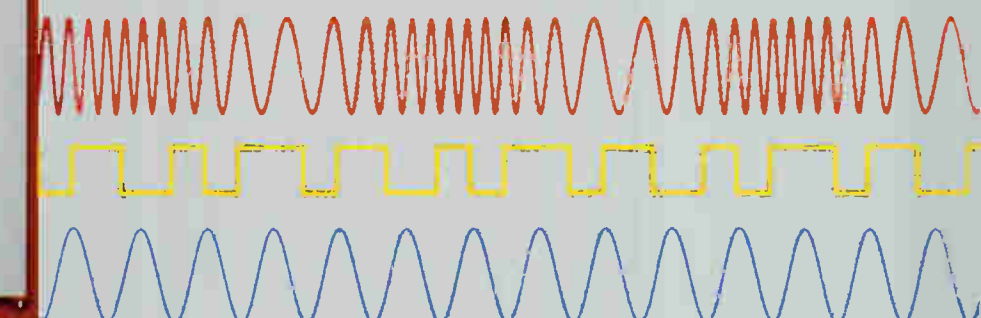
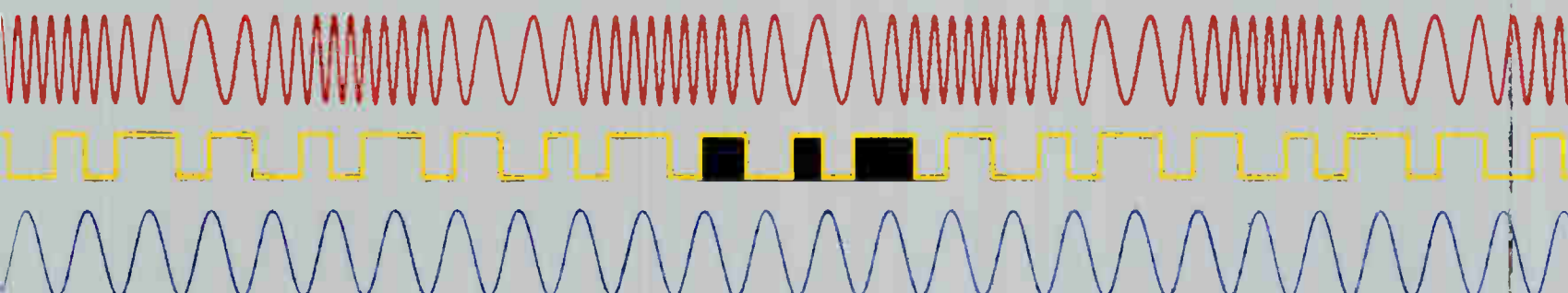
For QEI 1KW — 30KW FM Broadcast Transmitters



- 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

QEI Corporation

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



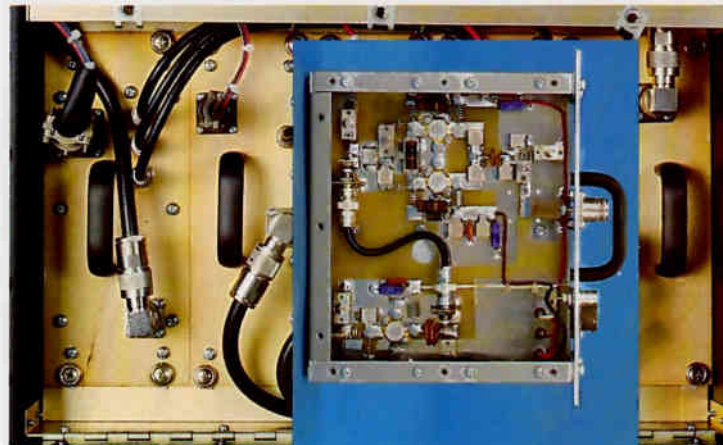
Introducing "The New Reliables"

QEI FMQ-series transmitters offer a unique package of features and total reliability. QEI exciters set 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 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 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)



Modular IPA Assembly Inset: An IPA Amplifier Module

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

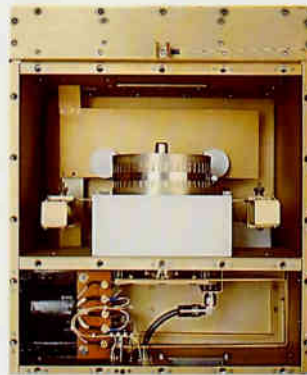
- (1) An automatic power control/splitter module
- (2) One (for 3.5 KW) or Two (for 5 KW) 250 watt amplifier modules
- (3) A combiner module.

The IPA provides sufficient drive plus a generous amount of additional headroom to the final power amplifier to insure 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

The conservatively designed FMQ-3500 and FMQ-5000 power amplifiers use a 3CX3000A7 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.



Power Amplifier

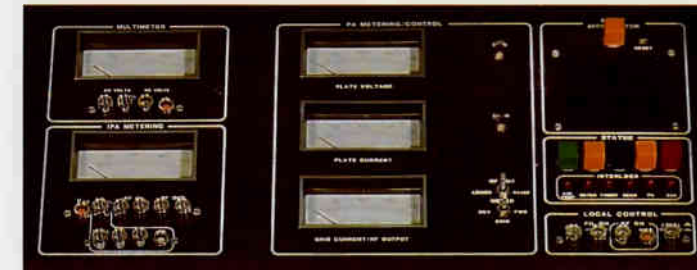
The FMQ-series has been designed for easy, straightforward and safe access to all components. The tuning assembly and component mountings are extremely rugged. The input tuning and loading controls are conveniently mounted on a front panel and are exceptionally smooth in operation. The motor-driven output tune and load plates 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 output of the power amplifier passes through an internally mounted low pass filter and

directional coupler. The 1-5/8" EIA RF output connector is top-mounted.

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.



Transmitter Control Panel (Basic Unit Shown)

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 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 10½" of available rack space, which can be used for auxiliary equipment (eg. an STL receiver) eliminating the need for an additional rack cabinet.

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 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 .02%) and almost unmeasurably low noise levels. Up to three SCA's can be accommodated, with virtually no IM distortion.



695 Exciter

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.

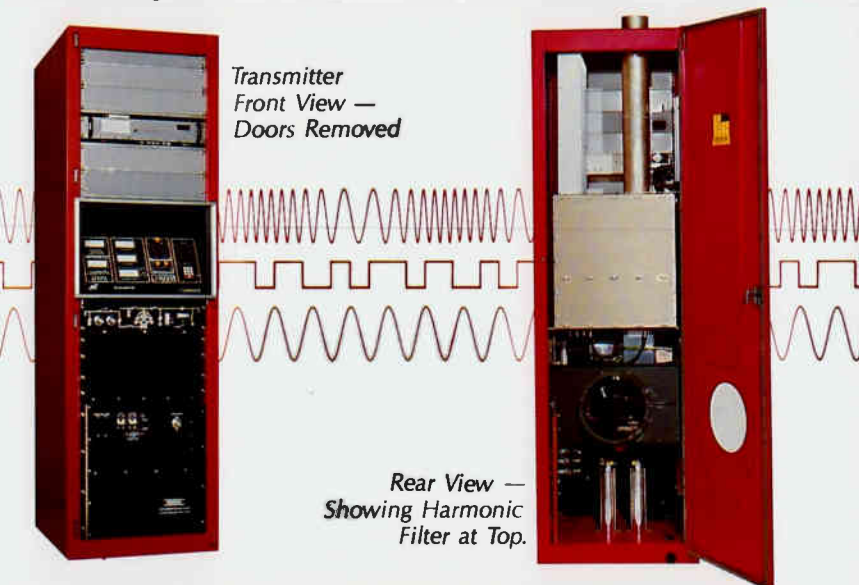
The ARC-27 Automatic Remote Control is perfectly matched to QEI FM transmitters. Completely microprocessor-based, the ARC-27's studio control unit allows complete control of all operating functions and parameter readings through a direct-entry keypad and easy-to-read LCD display. Complete diagnostic and fault alarm facilities are provided, both at the transmitter and at the studio. An extensive multiple-location communications package is optionally available.

The ARC-27 remote system operates with standard voice-grade telephone lines, an STL/SCA, or any combination of both (for example, an STL from studio to transmitter and TSL return.) Of course, the ARC-27 meets all FCC requirements for remote transmitter operation. It will surely meet your own requirements for convenience, flexibility and performance.



ARC-27 Studio Control Unit

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



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



The New Reliables

FMQ-3500 FMQ-5000

Electrical and Mechanical

AC Power Requirements . . . 208-240 VAC Single Phase
50/60 Hz
Power Consumption <6.4 KW @ 3750 W. RF Out
Power Consumption <9.5 KW @ 5500 W. RF Out
Dimensions 24"W. x 76"H. x 30" D.
(61 Cm x 193 Cm x 76 Cm)
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 Poser; H.V. Om
Metering/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 87.5 to 108 MHz
Frequency Selection Synthesizer 100 kHz Steps
(10 kHz Steps Optional)
Output Impedance/Connector 50 Ohms, 1 5/8" EIA
Stability vs. Temperature ± 200 Hz, 0-50°C.
Distortion (THD)025%
Distortion (IMD)025%
Transient Intermod. Dist. (TIM)025%
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 3.5 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 /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)

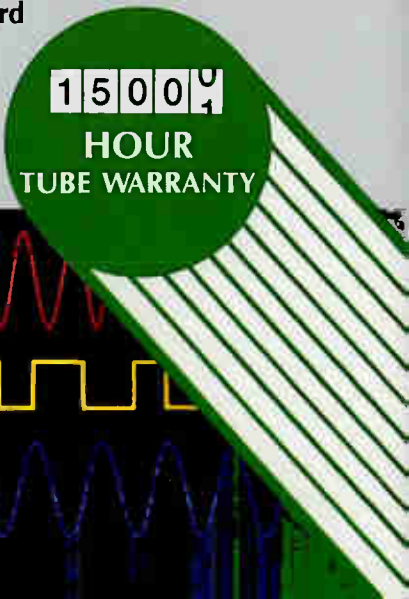
Model 695 Exciter
— (Replacing Model 675 Exciter) . Add /03 to Model Number

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



3.5 KW • 5 KW FM Broadcast Transmitters

- Designed For Ultra-Reliability
- Single Tube Design — A Grounded Grid Eimac 3CX3000A7
- 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
- Internally Mounted Low-Pass Filter And Direction Coupler
- Single-Phase Power Supply Standard



QEI Corporation

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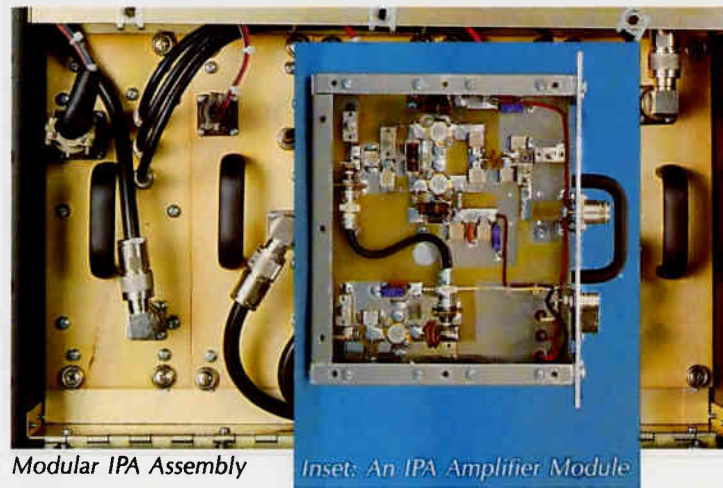
Introducing "The New Reliables"

QEI FMQ-series transmitters offer a unique package of features and total reliability. QEI exciters set 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 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 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:

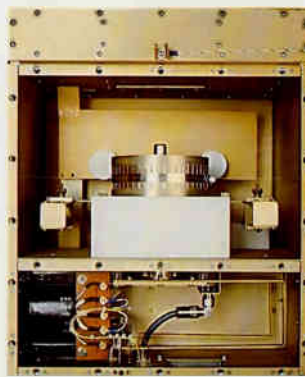
- (1) An automatic power control/splitter module
- (2) Three 250 watt amplifier modules
- (3) A combiner module.

The IPA provides sufficient drive plus a generous amount of additional headroom to the final power amplifier to insure 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

The conservatively designed FMQ-10000 power amplifier uses an Eimac 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.



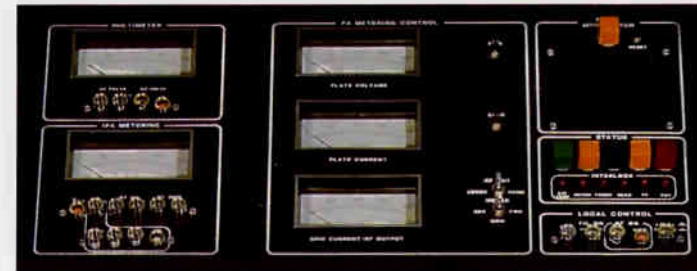
Power Amplifier

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" EIA RF output connector is top-mounted.

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.



Transmitter Control Panel (Basic Unit Shown)

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 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

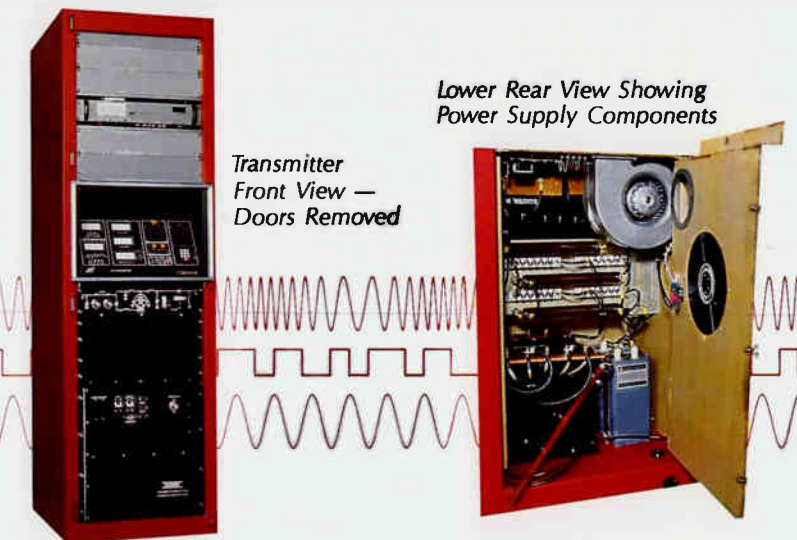
Covers the following conditions:

- 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 1/2" of available rack space, which can be used for auxiliary equipment (eg. an STL receiver) eliminating the need for an additional rack cabinet.



Transmitter Front View — Doors Removed

Lower Rear View Showing Power Supply Components

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 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 .02%) and almost unmeasurably low noise levels. Up to three SCA's can be accommodated, with virtually no IM distortion.



695 Exciter

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.

The ARC-27 Automatic Remote Control is perfectly matched to QEI FM transmitters. Completely microprocessor-based, the ARC-27's studio control unit allows complete control of all operating functions and parameter readings through a direct-entry keypad and easy-to-read LCD display. Complete diagnostic and fault alarm facilities are provided, both at the transmitter and at the studio. An extensive multiple-location communications package is optionally available.

The ARC-27 remote system operates with standard voice-grade telephone lines, an STL/SCA, or any combination of both (for example, an STL from studio to transmitter and TSL return.) Of course, the ARC-27 meets all FCC requirements for remote transmitter operation. It will surely meet your own requirements for convenience, flexibility and performance.



ARC-27 Studio Control Unit

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

The FMQ-10000 has been newly configured to provide the optimum in accessibility with safety. The lower front interlocked panel is hinged for access to the transmitter's control circuitry. 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 <17 KW @ 10 KW RF Out
Dimensions 24"W. x 76"H. x 30" D.
(61 Cm x 193 Cm x 76 Cm)
Weight 980 Lbs. (445 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. On

Metering/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-10000 5000-10500 Watts
Frequency Range 87.5 to 108 MHz
Frequency Selection Synthesizer 100 kHz Steps
(10 kHz Steps Optional)
Output Impedance/Connector 50 Ohms, 1 5/8" EIA
Stability vs. Temperature ± 200 Hz, 0-50°C.
Distortion (THD)025%
Distortion (IMD)025%
Transient Intermod. Dist. (TIM)025%
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 3.5 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 /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 Control are briefly described in this brochure. Both products are covered fully in separate brochures available from QEI.



The New Reliables

FMQ-10000

10 KW FM Broadcast Transmitter



- Designed For Ultra-Reliability
- Single Tube Design — A Grounded Grid Eimac YU148 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

15000
HOUR
TUBE WARRANTY

QEI Corporation

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

The FMQ-20000 and FMQ-30000 transmitters include the latest technological advances coupled with QEI's traditional conservative and efficient design. And, 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 Driver Cabinet



Driver Cabinet — Front, Door Removed

The Driver for 25 KW to 30 KW power levels is the QEI FMQ-3500 transmitter. A complete 3.5 KW transmitter in itself, the FMQ-3500 features a modular and completely accessible solid state IPA. The power amplifier uses a 3CX3000A7 triode in grounded grid service.

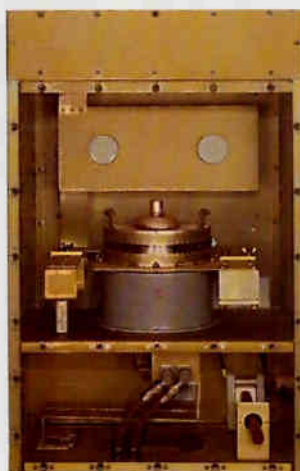
The 100% solid state FMQ-1000 serves as the driver for the FMQ-20000. The IPA and power amplifier of the FMQ-1000 are bipolar transistor based, with full protective circuitry. And the multi-modular design of the amplifier provides redundant operation if a module should ever fail.

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

As self-contained transmitters, the 1 KW and 3.5 KW Drivers can be operated independently of the final amplifier. In an emergency situation, the Driver can be fed directly to the antenna to get your station back on-air in seconds.

The Power Amplifier

The conservatively designed FMQ-20000 and FMQ-30000 power amplifiers use a 3CX15000A7 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 circuitry itself is inherently broadband for superior stereo performance.

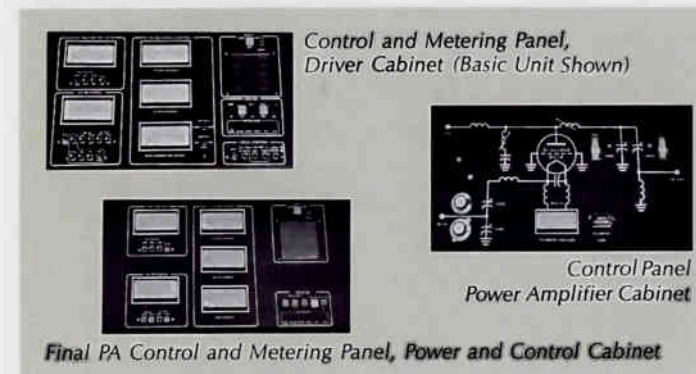


Final Power Amplifier

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 tune and load plates 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 metered 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 Reliables" 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.



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 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 .02%) and almost unmeasurably low noise levels. Up to three SCA's can be accommodated, with virtually no IM distortion.



695 Exciter

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.

The ARC-27 Automatic Remote Control is perfectly matched to QEI FM transmitters. Completely microprocessor-based, the ARC-27's studio control unit allows complete control of all operating functions and parameter readings through a direct-entry keypad and easy-to-read LCD display. Complete diagnostic and fault alarm facilities are provided, both at the transmitter and at the studio. An extensive multiple-location communications package is optionally available.

The ARC-27 remote system operates with standard voice-grade telephone lines, an STL/SCA, or any combination of both (for example, an STL from studio to transmitter and TSL return.) Of course, the ARC-27 meets all FCC requirements for remote transmitter operation. It will surely meet your own requirements for convenience, flexibility and performance.



ARC-27 Studio Control Unit

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

Metering

Eleven meters provide full monitoring of the Driver and Final Power Amplifier sections. The PA plate voltage and PA plate current of both the Driver and Final Power Amplifier sections are displayed on four dedicated meters. Both sections also include a separate meter which indicates forward/reverse PA output power, 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 nine selectable points, including 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 contains 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
- VSWR 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 center of the cabinets for operator convenience when taking readings. Above the exciter in the Driver cabinet is 10 1/2" of available rack space, which can be used for auxiliary equipment (e.g. an STL receiver) eliminating the need for an additional rack cabinet.



Driver Cabinet — Rear View, Door Open

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 transmitter and its operator are protected from dangerous operating conditions by door, air pressure, and safety interlock switches and an interlocked grounding stick is provided.

20 KW - 30 KW FM Broadcast Transmitters



(Shown Without Doors) Driver Cabinet with ARC-27 Remote

Power and Control Cabinet

Power Amplifier Cabinet

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 76"H x 30"D
(61 Cm x 193 Cm x 76 Cm)
Dimensions - Power and Control Cabinet 24"W x 76"H x 30"D
(61 Cm x 193 Cm x 76 Cm)
Dimensions - Power Amplifier Cabinet 24"W x 76"H x 30"D
(61 Cm x 193 Cm x 76 Cm)
Weight - Driver Cabinet (FMQ-1000) 850 Lbs. (386 Kg)
Weight - Driver Cabinet (FMQ-3500) 930 Lbs. (423 Kg)
Weight - Power and Control Cabinet 1200 Lbs. (545 Kg)
Weight - Power Amplifier Cabinet 650 Lbs. (295 Kg)

Controls and Status Indicators

Driver Cabinet

Local Control Pushbuttons Off; Fil. On / H.V. Off;
RF On - High; Local/Remote 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
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
PA Input Tune and Load Knob, 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 Raise/Lower switch, center off
Auto Remote Control Keypad; Indicators and LCD Panel -
Supplied with ARC-27 Remote Control
Lower Front Panel Filament Voltage Adjust; High Voltage,
IPA (+45V) and Filament Circuit
Breakers; Filament Hour Meter;
Sample, Blower, and Control Fuses.

Power and Control Cabinet

Circuit Breaker Panel PA Blower; Driver; PA Fil.; H.V.;
F1-F2-F3 Fuses
Status Indicators Line Ready 1, 2 and 3; Fil. On;
H.V. On
Interlock Indicators Air; Front Panel;
Rear; Aux
Metering/Switches Multimeter: 4 Function Pushbutton
RF Metering: 4 Function Pushbutton
PA Plate Voltage Meter
PA Plate Current Meter
PA Grid Current Meter
Fault Annunciator Panel 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
Metering PA Filament Voltage Meter
Filament Hour Meter

Performance

Power Output FMQ-20000 10-20 KW
Power Output FMQ-30000 10-30 KW
Frequency Range 87.5 to 108 MHz
Frequency Selection (Synthesizer) 100 kHz Steps
(10 kHz Steps Optional)
Output Impedance Connector 50 Ohms, 3 1/8" EIA
Stability vs. Temperature ± 200 Hz, 0-50°C.
Distortion (THD)025%
Distortion (IMD)025%
Transient Intermod. Dist. (TIM)025%
Incidental AM At least -50dB
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 3.5 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 Order option 01
—For STL connection Order option 02
(Includes option 03 - 695 Exciter replacing 675 Exciter)

Four extra remote control channels for user-defined purposes
—(requires option 01 or 02) Order option 04

Model 695 Exciter
—(Replacing Model 675 Exciter) Order option 03

Terminal Control Package
—For multiple location, password-protected control via dial-up
phone lines, plus autodial alarm notification. (Requires option 01
or 02) 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.

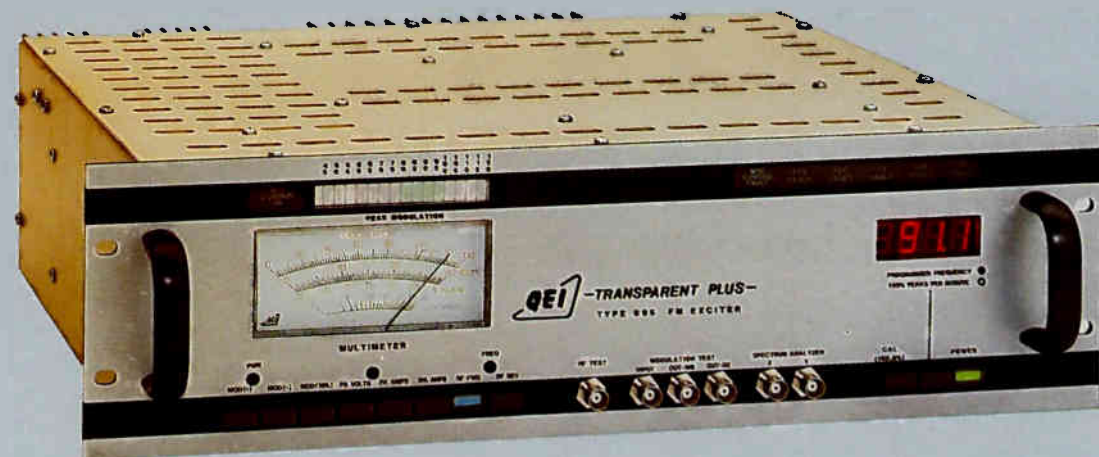
QEI maintains an ongoing program of research and development to insure the finest product performance and quality. These specifications are therefore subject to change without notice.

FMQ 2030 6-87 5M

QEI Corporation

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

TRANSPARENT PLUS



695 FM Broadcast Exciter

GENERAL

The 695 is an advanced technology FM exciter 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 (3) 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 DISTORTION

There is no "pre-distortion" network in the 695. QEI does not believe that a design should add distortion in hopes 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 this almost distortion-free profile in an engineering lab but will do it in your/our transmitter over a wide temperature range and under normal station operating conditions!

The Frequency Modulated Oscillator (FMO) is the "heart" of any exciter. With considerable design effort, QEI has achieved the optimum linearity for an FM exciter. 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 ballistics. 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 (85-100%), the

bar graph operates in a green area or a yellow area if below 85%. Should the modulation exceed 100% the bar graph will move into a red area. Additionally, the bar 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 exciter 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 exciter 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 exciter state of the art. 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 exciter's front panel sound like thunder on the radiated signal. Techniques developed for QEI's 675 exciter 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 X-Y BNC jacks, a ± 120 kHz spectral dis-

play 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.

BROADBAND 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 adjusted from 5 to 20 watts.

OTHER FEATURES

The 695 ties into any FMQ series diagnostic circuitry, providing key parameter measurements on the transmitter's diagnostic display.





695T1KW

FM BROADCAST TRANSMITTER

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 heretofore 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

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.

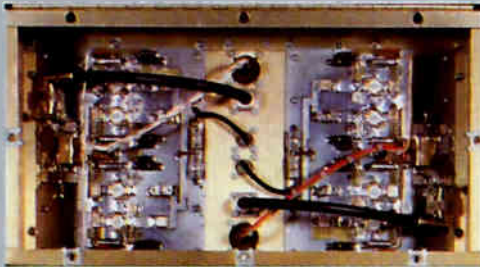
The IPA section contains 3 bipolar transistors, each with its own protective circuitry. Both the input and output power are continuously monitored and the variable attenuator between the exciter and IPA is automatically adjusted to insure the transmitter's RF output remains precisely at its pre-set level.

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.

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.



Intermediate Power Amplifier

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

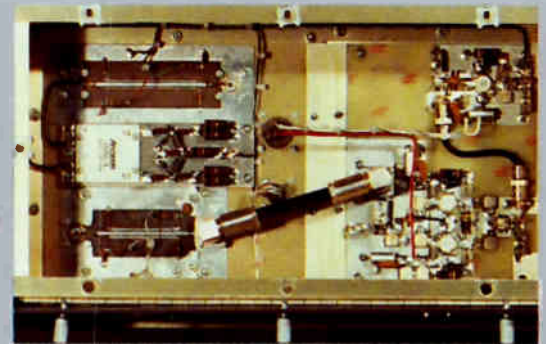
Features and performance are the hallmarks of this new, super-low distortion, exciter. The 695 employs a phase-locked-loop (PLL) oscillator for frequency stability, special varicap circuitry for superlative linearity that does not vary with temperature and broadband amplifiers for ease of tuning and 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 695 Exciter

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



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 a system failure the basic control functions can be initiated manually and sequencing reverts to electro-mechanical logic.

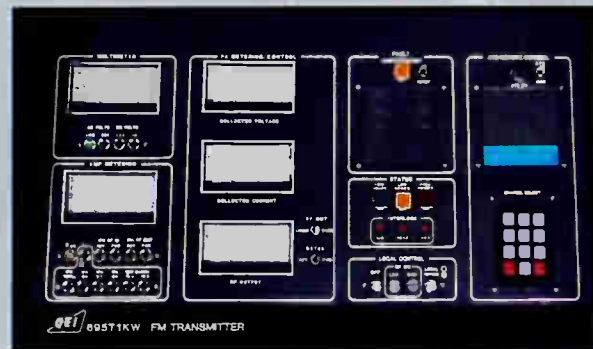
Any sustained interruption in primary power, an abnormal VSWR or an IPA/PA overload will cause the transmitter to drop to its low power position or completely shut down. The system will make 3 attempts to re-establish full power output but if the condition has not cleared, the transmitter will remain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

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 Annunicator 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 accoustical 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.

Fallsafe

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.

Front View with
Doors Removed



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.



The Remote Control Unit

Specifications

Performance

Power Output	1000 Watts
Frequency Range	87.5 to 108 MHz
Frequency Selection (Synthesizer)	100 kHz steps
Output Impedance/Connector	50 ohms, 1 5/8" EIA
Stability vs Temperature	± 200 Hz (0° - 50° C.)
Distortion (THD)	.025% (0° - 50° C.)
Distortion (IM)	.025% (0° - 50° C.)
Transient Intermod. Dist. (TIM)	.025% (0° - 50° C.)
FM Noise	at least -75 dB
AM Noise	at least -55 dB
Mono Input	+10 dBm, 600 ohms
Stereo Input	3.5 V _{rms} , 10K ohms
SCA Input	1 V _{p-p} , (for 10% inj.), 10K ohms

Electrical and Mechanical

AC Power Requirement*	208-240 VAC, 50/60 Hz
Power Consumption	2.0 kW
Dimensions	24" W X 76" H X 30" D (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) V_c, I_c, calculated indirect power & time

Alarms

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

Automatic Transmission System (ATS)

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

Over/under modulation, over/under power, self-check (2), tower light, carrier on/off

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	FM Mod. Monitor	691
SCA Gen.	811	Accoustical	
External Status & Control		Coupler	AC-1
Interface	XM-6	CRT	ADM-5
		FCC Autologger	PRT-1

*Other power inputs available on request

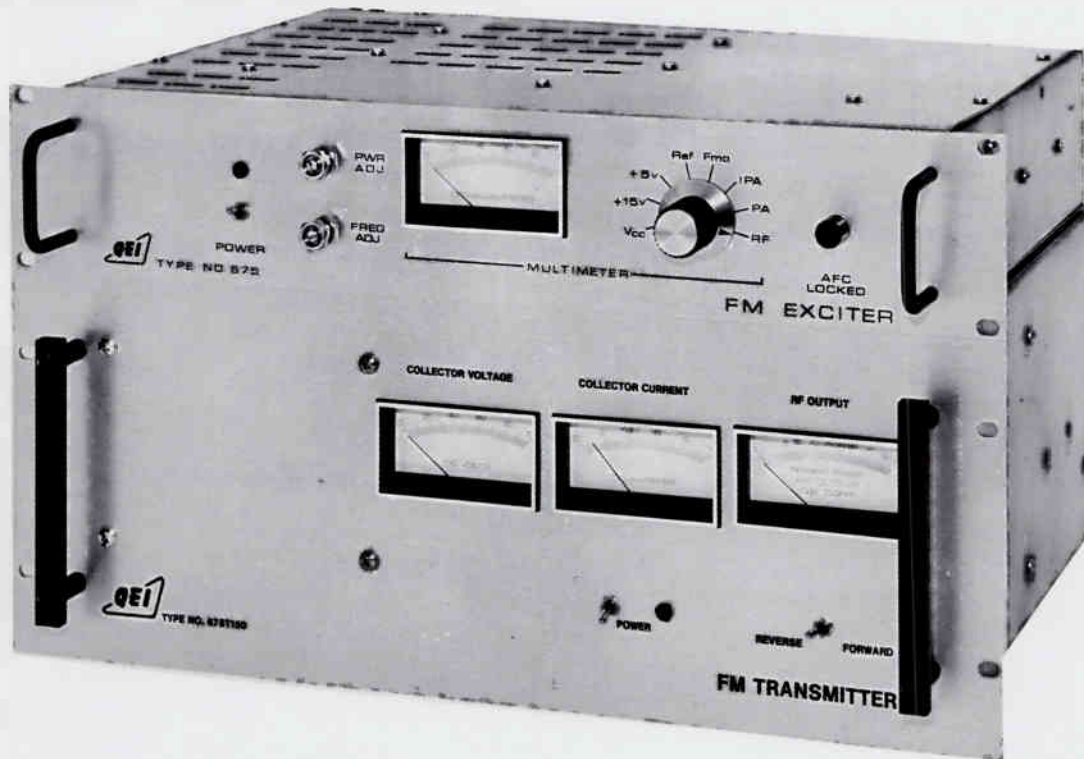


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These Specifications Subject to Change Without Notice
Form No. 6951KW 0481

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.



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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 ± 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 (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.



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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.



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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
screw connection
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)
Ambient
Primary Power 115/230 vac., 50/60 Hz, 600 watts max.

optional equipment

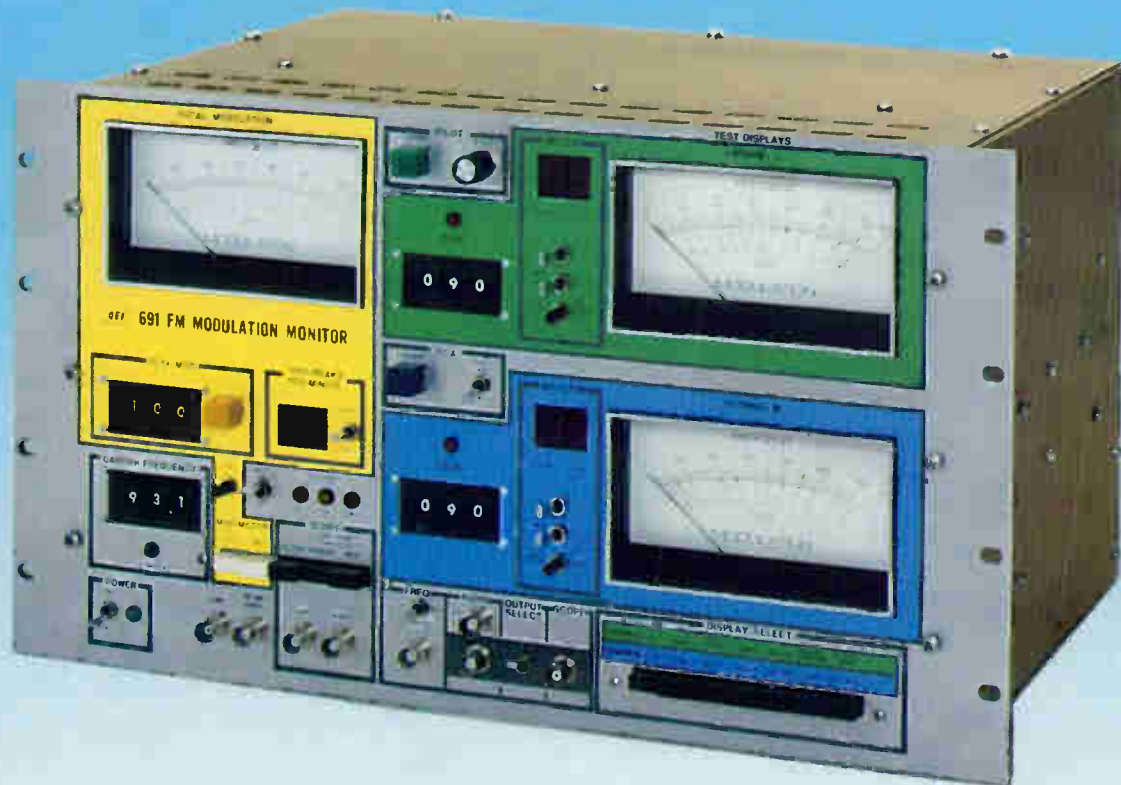
A remote control package is available. This option includes PA voltage and current samples, momentary closure on/off function and a motor driven power control. Order 675T300R.



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Representative

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 besel null feature allows calibration verification

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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 10½" 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

Total Modulation (%)

Left or Right Modulation (%) and Peaks

Total Peaks (0-199%)

Peaks Per-Minute (100%)

Pilot Level

Left, Right or SCA Peaks

SCA Injection

Crosstalk:

Main to Stereo Sub

Stereo Sub to Main

Main to SCA

SCA to Main

Stereo Sub to SCA

SCA to Stereo Sub

Stereo Separation

Left into Right

Right into Left

Signal-to-Noise:

Unweighted left, right or main channel

De-emphasized left, right or main channel

Stereo subcarrier weighted or unweighted

SCA weighted or unweighted

Left, Right, SCA or Total

Frequency Response

SCA Modulation Asymmetry

Occupied Bandwidth*

Stereo Phase (vector display)*

Relative Signal Strength*

AM or FM Noise

Stereo Generator Phase

*When used with an Oscilloscope

Multipath

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.

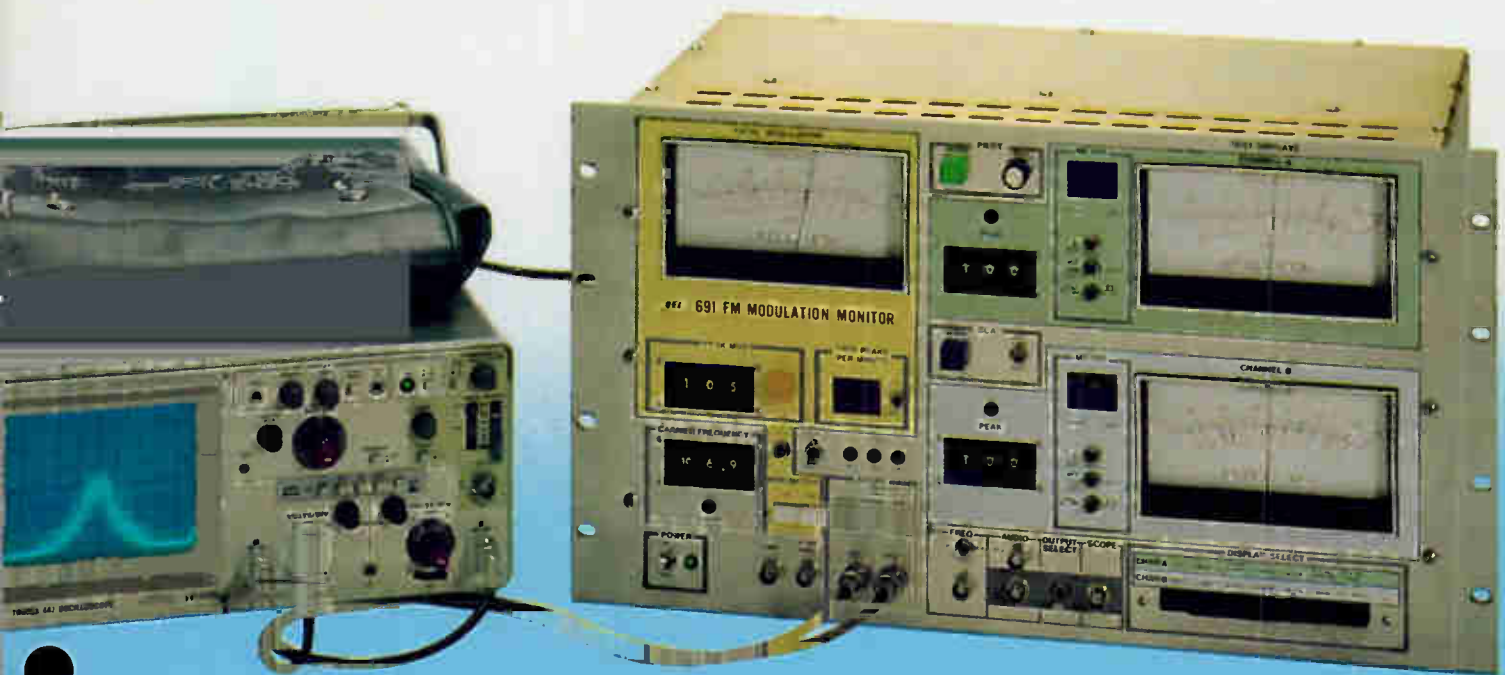
Additionally the phase relationship between the left and right channels may also be viewed on the oscilloscope as a vector display. This simplifies stereo phase adjustments and allows continuous monitoring of the phase relationship of an off-the-air signal.

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 pre-determined level (adjustable from 0 to 199%). LED peak flashers, also adjustable, are used for channel A and channel B displays.

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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 $\pm 2\%$ 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 $\pm 1\%$

Peak Counter

Set Point $100\% \pm 1\%$
Time 1 minute ± 1 sec

Distortion 0.05% THD or IMD

S/N better than 75 dB (with 75 μ Sec de-emp)

Test Displays (2)

Meter Accuracy $\pm 2\%$ entire range
Peak Indicator Accuracy $\pm 1\%$
Pilot & SCA Injection Accuracy $\pm 0.5\%$ (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 μ Sec de-emp)

Outputs

Left + 10 dBm bal. and Hi-Z
Right + 10 dBm bal. and Hi-Z
Scope 1 V_{pp}
Frequency X.O., I.F., Pilot, SCA

Spectrum Analyzer Output 70 dB \pm 120 kHz or \pm 300 kHz

X (horiz) 4 V_{pp}
Y (vert.) 0.5 V/10 dB

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: 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.



QEI Corporation

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GENERAL

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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.

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.

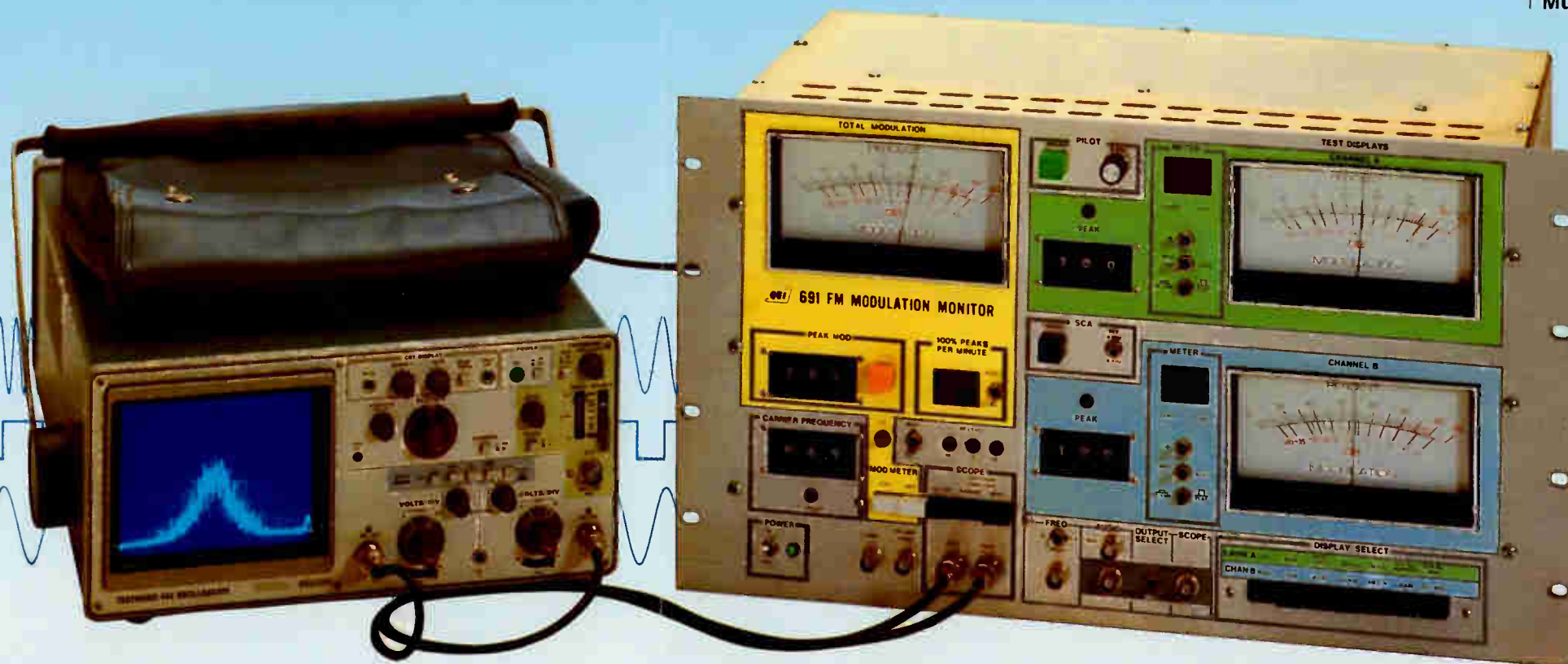
PEAK FLASHERS AND COUNTERS

The total modulation flasher illuminates each time the level of modulation exceeds a pre-determined level (adjustable from 0 to 199%). 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.

tests, and more, with QEI Model 691

- Total Modulation (%)
- Left or Right Modulation (%) and Peaks
- Total Peaks (0-199%)
- Peaks Per-Minute (0-199%)
- Pilot Level
- Left, Right or SCA Peaks
- SCA Injection
- Crosstalk:
 - Main to Stereo Sub
 - Stereo Sub to Main
 - Main to SCA
 - SCA to Main
 - Stereo Sub to SCA
 - SCA to Stereo Sub
- Stereo Separation
 - Left into Right
 - Right into Left
- Signal-to-Noise:
 - Unweighted left, right or main channel
 - De-emphasized left, right or main channel
 - Stereo subcarrier weighted or unweighted
 - SCA weighted or unweighted
- Left, Right, SCA or Total
- Frequency Response
- SCA Modulation Asymmetry
- Occupied Bandwidth*
- Stereo Phase (vector display)*
- Relative Signal Strength*
- AM or FM Noise
- Stereo Generator Phase
- Multipath*

Model 691 When Used As A Spectrum Analyzer



*When used with an Oscilloscope



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	0-199% ± 1%
Time	1 minute ± 1 sec
Distortion	
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) FM S/N	AM S/N
6) SCA Inj. #1	SCA Mod. #1
7) SCA Inj. #2	SCA Mod. #2
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	600 ohms balanced and Hi-Z
Right	600 ohms balanced and Hi-Z
Scope	1 V _{pp}
Frequency	X.O., I.F., Pilot, SCA
Spectrum Analyzer Output	70 dB ± 120 kHz or ± 300 kHz
X (horiz)	4 V _{pp}
Y (vert.)	0.5 V/10 dB

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

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

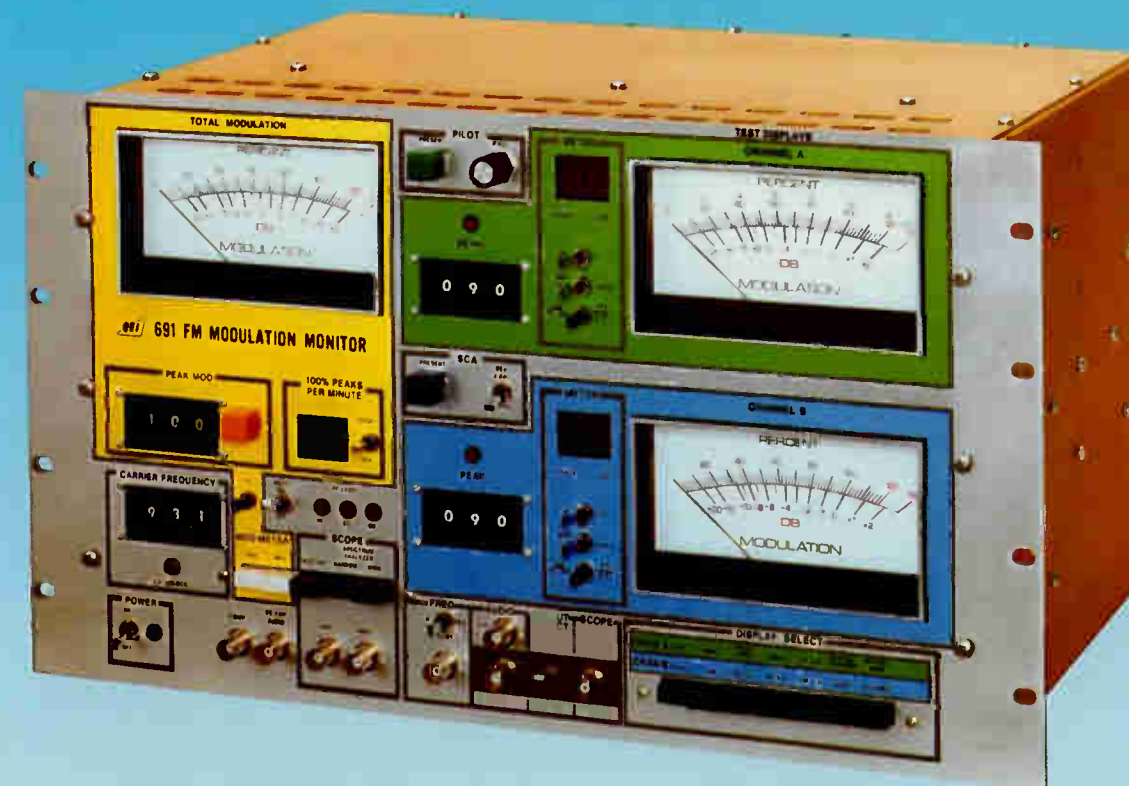
OPTIONS

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



Model 691

Tuneable Stereo Modulation Monitor and FM Test Set



- 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 X-Y 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 199% 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 trouble-shooting tests possible when used with an oscilloscope.
- Built-in modulation calibrator.
- Built-in besel null feature allows calibration verification.
- Full one year warranty on all parts and labor.



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