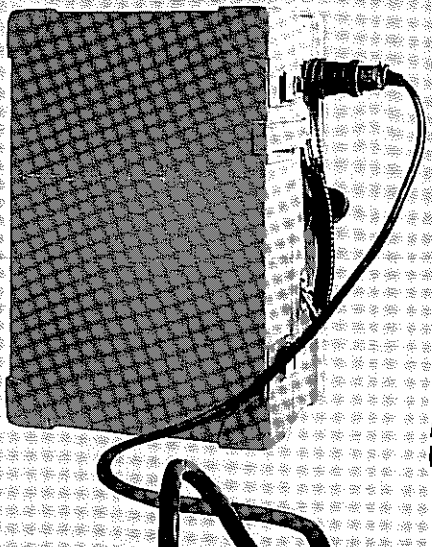


TEMPO INSTRUMENT INCORPORATED

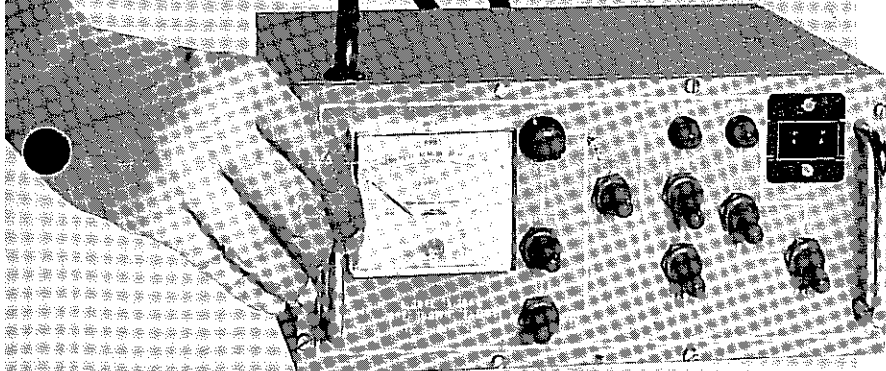
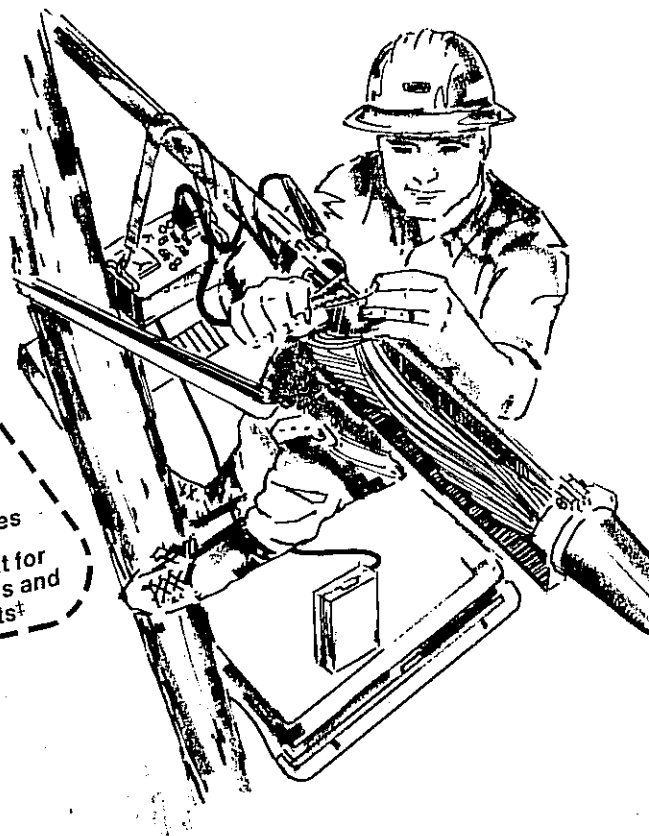
BULLETIN T14103
Revised July, 1974



**NEW
IMPROVED
MODELS**

With Secondary
Identification Tone
And Rain-Sealed Switches

Now Standard Equipment for
Bell Operating Companies and
Leading Independents†



DESIGN & PERFORMANCE FEATURES

- **PORTABLE CONTROL MODULE**, for convenient use by craftsman on pole.
- **ELECTRONIC TONE CONTROL** works into impedances of 3000 ohms and audibly changes if weld breaks.
- **SECONDARY IDENTIFICATION TONE**—A rapid 577 Hz interrupted pair identifier tone is automatically provided when pair resistance rises above 1000 ohms.
- **ELIMINATES INTERNAL ARCING AND BREAKDOWN.**
- **EXTENDED BATTERY LIFE.**
- **BREAKDOWN OPERATION** is simplified by automatic polarity reversal.
- **SAFETY-ENGINEERED DESIGN**, with insulated control module.
- **SWITCH REPLACEMENT ELIMINATED**—panel switches handle only low voltage and low current.
- **WEATHERIZED DESIGN**, with water-resistant control module, and equipment case that can be operated with a protective cover in place.

Series 651084C*

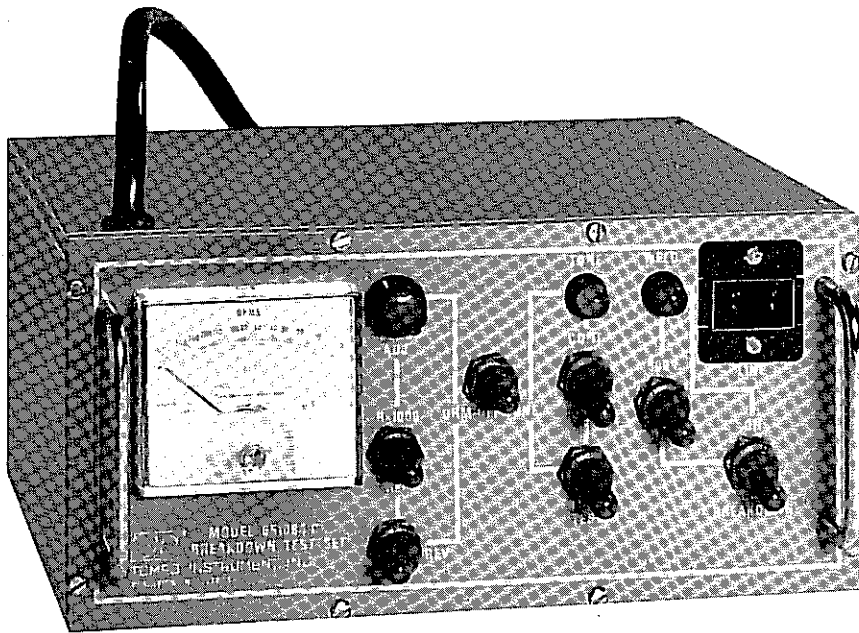
Cable Breakdown Test Sets

GENERAL DESCRIPTION

Tempo Series 651084C Test Sets are designed for field use in locating cable faults. They are solid state electronic devices, functionally equivalent to the Western Electric KS14103 Test Set. The Tempo Test Sets are capable of checking conductor and insulation resistance, and breaking down faults by applying a potential of approximately 600 volts between a faulty pair. They provide a tone signal for location of the fault by the exploring coil method. Each Test Set consists of a removable Test Control Module and a Battery/Equipment Case, plus interconnecting cables, necessary carrying handles and straps.

*PAT. APPLIED FOR

**SERIES 651084C
CABLE BREAKDOWN
TEST SETS**



Test Control Module

Series 651084C

The Test Control Module is a self-contained, insulated unit in a high-impact plastic case which houses all control and test circuits. It is equipped with a power cable with male connector at one end for coupling to the Battery/Equipment Case. Two handles are provided for removal of the lightweight module by a gloved operator. The two handles can be utilized, along with the removable hanging strap, to carry or hang the module while in use at pole heights. The various circuits, switches, and operating characteristics of the Test Control Module are described below: (All switches control *low voltage only*—the possibility of an electrical accident due to switch failure is minimized.)

BREAKDOWN CIRCUITS AND CONTROLS

The breakdown controls and indicators consist of a 600 VOLT ON-OFF toggle switch, a BREAKDOWN ON-OFF toggle switch of the momentary type in the ON position, a WELD INDICATOR lamp, and a 0 to 5 ampere meter. *The breakdown potential does not appear at any of the controls.*

The 600 VOLT ON-OFF switch applies control voltage to the BREAKDOWN switch. The BREAKDOWN switch enables the breakdown output circuits, and weld sensor discussed below, when held in its momentary ON position. When the BREAKDOWN switch is activated, all other circuits are disabled, regardless of the position of their switch controls.

BREAKDOWN OUTPUT CIRCUIT

The breakdown output circuit consists of a breakdown current switching circuit and an automatic polarity-changing circuit which provides the breakdown voltage to the LINE output connector at a frequency of $\frac{1}{2}$ Hz $\pm 10\%$.

The switching circuit continues to function as long as the BREAKDOWN switch is energized and a weld has not been sensed. The breakdown current is indicated on the panel meter. The output circuit is capable of withstanding an insulation resistance test of 1500 VDC at 95% relative humidity at a temperature of 100°F (in the breakdown mode) for a period of 1 minute.

CURRENT SENSING/TIMING CIRCUIT

This circuit monitors the current flow in the output circuit. When this circuit senses a minimum of 1 ampere for $\frac{1}{2}$ second it turns the breakdown supply OFF and lights the WELD lamp, indicating that breakdown has occurred.

Once the WELD lamp is on, it remains on until the BREAKDOWN switch is returned to the OFF position. The breakdown circuits can then be reactivated if an ohmmeter check reveals that a solid weld has not been achieved.

RESISTANCE MEASURING CIRCUIT

Provides a meter indication of the resistance appearing at the LINE connector. The circuit function switch has three positions: Rx1, OFF and Rx1000. It is operational when the OHMS-OFF-TONE switch is in the OHMS position. A ZERO ADJUST potentiometer is provided to zero the meter.

A front-panel switch, enabled only during the ohmmeter mode, provides electrical reversal of the input to the ohmmeter circuit for "capacitive kick" and imbalance measurements.

The resistance measuring circuit is not operational when the breakdown circuit is enabled.

STONE SOURCE

The electronic tone generator provides a symmetrical alternating 577 Hz $\pm 10\%$ signal to the LINE connector. A TONE toggle switch is provided to select a CONTINUOUS or INTERRUPTED operating mode. In the INTERRUPTED mode, the primary tone has a period of one second with a duty cycle of approximately 50%. Those sets with primary tone only provide a useable output into 0-3000 ± 500 ohms. Sets with Secondary Identification Tone provide the primary tone into resistances of 0-1000 ± 250 ohms and then automatically switch to the faster pair identifier tone as the resistance rises. The TONE circuits are enabled when the OHMS-OFF-TONE switch is in the TONE position and are inoperative when the breakdown circuits are enabled. A TONE TEST switch and indicator lamp are provided to check the TONE circuit. When the TONE circuit is operating and the TONE TEST switch is activated, the TONE indicator lamp will light.

PANEL METER

The meter is a 2% ruggedized type which maintains its calibration in any plane. It is of water-resistant construction. The meter scales are calibrated from 0 to 5 amperes and 0 to 2000 ohms.

LINE CONNECTOR

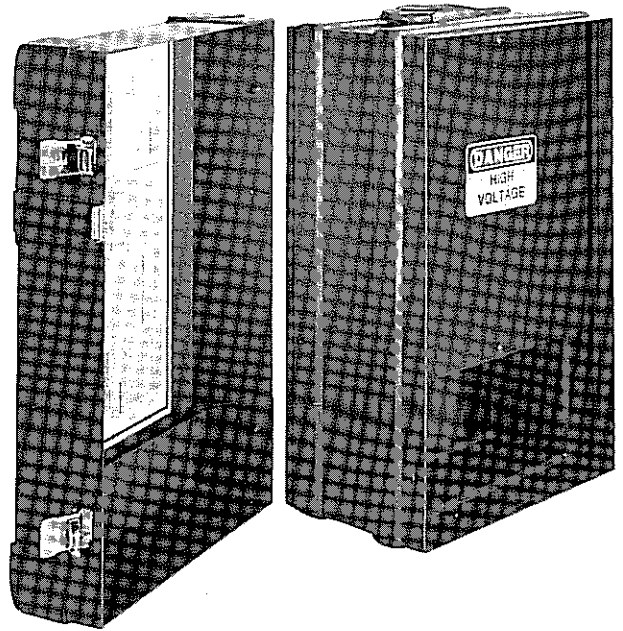
The LINE connector on the front panel is a female connector, H.B. Jones type, S-2402 socket or equivalent.

CABLES

Two cables are provided with the Series 651084: a power supply cable and a test lead cable.

The POWER SUPPLY CABLE is flexible and can be coiled over temperatures ranging from -10°F to $+135^{\circ}\text{F}$. The cable jacket is abrasion and crack resistant. The cable and its connector, when isolated from the control unit, is capable of withstanding a dielectric test of 1500 volts RMS between conductors and pins for a period of one minute. The cable is terminated on one end in a male connector which mates with the Battery/Equipment Case connector. The other end of the power cable is permanently affixed to the Control Module.

The TEST LEAD CABLE is a two-conductor cable. It is equipped with a male H. B. Jones connector type P-2402 on one end. This mates with the LINE connector on the Control Module. The opposite end of the test lead cable has the outer jacket removed for a distance of 2 feet. Each lead is terminated in a heavy duty insulated rubber boot covering a crocodile termination. The boots are color coded, red and black. The cable will withstand a 1500 volt RMS dielectric test from conductor to conductor and/or pin to pin for a period of one minute.



Battery/Equipment Case

Series 651084C

The Battery/Equipment Case is a metal case approximately $17\frac{3}{8}$ " long by $11\frac{3}{4}$ " wide by $8\frac{3}{4}$ " deep. It contains compartments for storage of the operating batteries, the Control Module and cables. The Battery/Equipment Case is equipped with a carrying handle and a metal handle for hanging the test set on a telephone cable step. A covered power output connector is mounted on the outside of the box. The metal cover of the Battery/Equipment Case is removable and is secured by two clasps. Stress points are welded and gusseted. The case and all hardware are protected with a weather-resistant finish.

WEATHER-RESISTANT DESIGN

After removal of the Control Module, the protective cover of the Battery/Equipment Case can be re-fastened for protection while the system is in use. An insulated battery liner prevents damage due to cell leakage or corrosion. The entire system has been designed for safe, reliable operation in inclement weather. The insulated Control Module is water-resistant, and all switches are sealed with rubber boots.

EXTENDED BATTERY LIFE

Field operation reports indicate that the automatic polarity-switching and shutdown operation considerably extends the battery life. Less time is required to perform the weld. In tests, systems were operated for 12 weeks, with over 30 welds performed, without battery replacement.

Series 651084C Models

Tempo offers several models for specific cable breakdown requirements. All models have the basic characteristics described on pages 1 through 3 and differ as shown below:

Model 651084C

Basic Set For 1-Man Crew

This model is the basic model in the 651084 series. It has a 30-foot power cable permanently affixed to the Control Module and a 6-foot set of Test Leads. A Hanging Strap is also provided.

Model 651084CS

With Pair Identification

Model 651084CS has all the features of the 651084C, with the added capability of secondary tone for pair identification and tracing after the weld breaks.

Model 651084CA

For 2-Man Crew Operation

This model is recommended for use in 2-man crew operation where the Control Module will not be taken up the pole. It is identical to the Model 651084C except that it includes a 2-foot long Power Cable (instead of 30 feet) and 35-foot long Test Leads (instead of 6 feet).

Model 651084CE

For Short-Haul Cable Operation

The Model 651084CE is intended for use on short haul cables only. It features a modified tone circuit with reduced output power and positive no-spill design. It is recommended for use in testing underground urban cables. A 2-foot long Power Cable and 15-foot Test Leads are included.

Model 651084CF

For 1 or 2-Man Crew Operation

Where either 2-man or solo operations are involved, the Model 651084CF is suggested. It is identical to the Model 651084CA, but includes a Hanging Strap and 30-foot Power Extender Cable.

Model 651084CFS

1 or 2-Man Crew Operation With Pair Identification

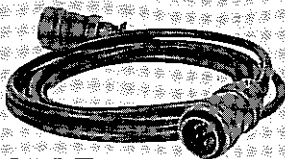
Model 651084CFS is identical to Model 651084CF except that it has the added capability of secondary tone for pair identification and tracing after the weld breaks.

MODEL SELECTION GUIDE

MODEL	Tone(s)	Power Cable (Affixed to Module)	Power Extender Cable (651325)	Test Leads	Hanging Strap
651084C	Primary Only	30'	Not Included	6' (651326)	Included
651084CS	Primary & Secondary	30'	Not Included	6' (651326)	Included
651084CA	Primary Only	2'	Not Included	35' (651328)	Not Included
651084CE	Special Short-Haul, Non-Spill	2'	Not Included	15' (651333)	Not Included
651084CF	Primary Only	2'	Included	35' (651328)	Included
651084CFS	Primary & Secondary	2'	Included	35' (651328)	Included

Accessories

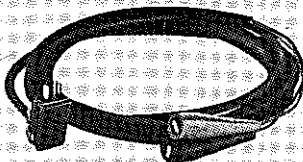
These accessory items are designed for use with any of the models in the 651084C Series.



POWER EXTENDER CABLE

Tempo P/N 651325— A 30-foot long power extender cable which allows the craftsman to use the Test Set without removing the Battery/Equipment Case from his truck.

- Protects batteries in wet weather
- Provides security against theft
- Allows operation in tight areas



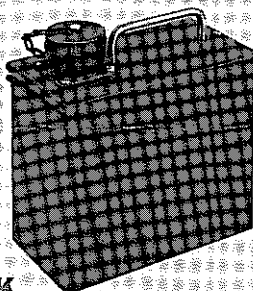
TEST LEADS

Tempo P/N 651326— 6-foot long test leads, terminated in Jones plug on one end, and red & black booted crocodile clips on other end.

Tempo P/N 651333— 15-foot long test leads, terminated same as 651326.

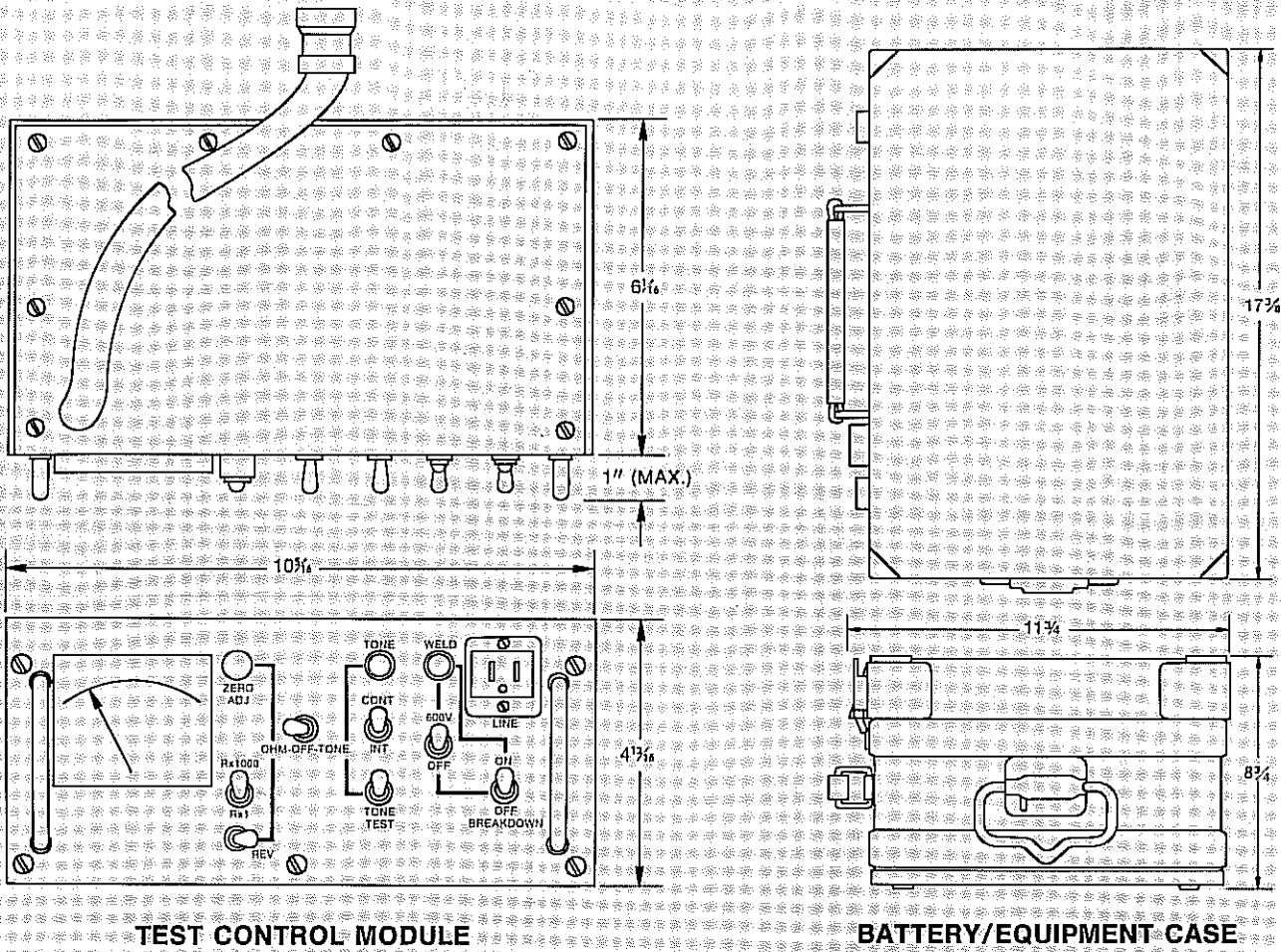
Tempo P/N 651328— 35-foot long test leads, terminated same as 651326.

Tempo P/N 651330— 35-foot long test leads. Consists of two lengths: 23-foot section (equivalent to Western Electric P2DB Cord) terminated in Jones plug on one end, and Jones S-202-CCT connector on other end; 12-foot section (equivalent to Western Electric W2EP Cord) terminated on one end in a red boot covered Jones connector P-202-CCT, and red & black booted crocodile clips on other end.



TONE/OHMS BATTERY POWER PACK

Tempo P/N 651331— Provides power for tone and ohmmeter circuits only. Can be left hanging on pole with Control Module. After breakdown has been achieved, this Power Pack permits continuation of work without the need for Battery/Equipment Case. Utilizes two 45-volt batteries and one 1½-volt battery (batteries not supplied).



TEST CONTROL MODULE

BATTERY/EQUIPMENT CASE

Series 651084C

Cable Breakdown Test Sets

ENVIRONMENTAL & PHYSICAL PROTECTION

The Control Module will operate properly over a temperature range from 20°F to 130°F and at a relative humidity of 95%.

The Series 651084C Test Set operates properly after being subjected to a drop test of 3 feet in any plane. This test has been performed with the batteries, Control Module and all cables secured in the covered Battery/Equipment Case.

OPERATING INSTRUCTIONS

A chart illustrating the front panel of the Control Module, together with a summary of operating instructions is permanently affixed to the Battery/Equipment Case cover. It is suitably protected against dirt and environment.

WARRANTY

Tempo Instrument warrants all Series 651084C Breakdown Test Sets against defects in material or workmanship for a period of one year from date of shipment. All units returned to the Tempo factory, delivery charges prepaid and deemed defective under this warranty will be replaced or repaired at Tempo's option. No other warranties are implied, nor will responsibility for operation of this device be assumed by Tempo.



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