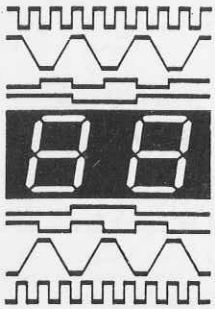


PHILIPS



Frequency Counters PM 6661 and PM 6664

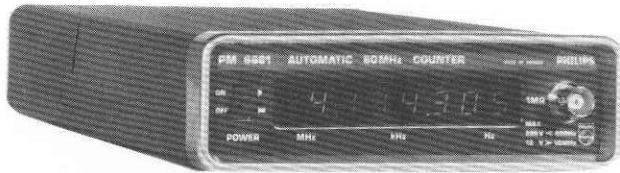
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Printing date 780815

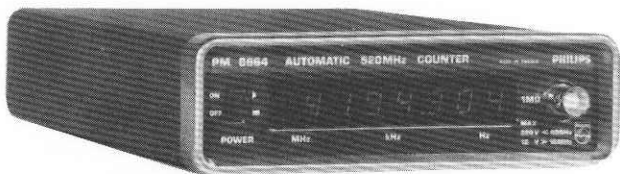




PHILIPS



Instruction Manual Frequency Counters PM 6661 and PM 6664



IMPORTANT

In correspondence concerning this instrument, please quote the type number and the serial number as given on the type plate of the instrument.

WICHTIG

Bei Schriftwechsel dieses Gerät betreffend, bitte die auf dem Typenschild angegebene Typ- und Seriennummer zu vermelden.

IMPORTANT

Dans votre correspondance et dans vos réclamations se rapportant a cet appareil, veuillez toujours indiquer le numéro de type et le numéro de série qui sont marqués sur la plaquette signalétique.

Contents

Introduction	3
Technical data	3
Accessories	3
Safety regulations	6
Service part	7

Inhaltverzeichnis

Einleitung	4
Technische daten	4
Zubehör	4
Schutzmassnahmen	6
Kundendienst anleitung	7

Table des matieres

Introduction	5
Caracteristiques-techniques	5
Accessoires	5
Prescriptions de sécurité	6
Notice d'entretien	7

1. Introduction

The PM 6661 and PM 6664 are 8 digits frequency counters with automatic triggering and input attenuation.

The sensitivity is $20 \text{ mV}_{\text{rms}}$ and the frequency range is 10 Hz to 80 MHz for the PM 6661 and 10 Hz to 520 MHz for the PM 6664.

The design of the instruments is subject to continuous development and improvement. Consequently, the instruments may incorporate minor changes in detail from the information contained in this manual.

2. Technical data

2.1. Measurement PM 6661

Frequency range: 10 Hz to 80 MHz

Gate time: 1 s

Resolution: 1 Hz

Input impedance: $1 \text{ M}\Omega//18 \text{ pF}$

Coupling: ac

AM tolerance: 30 %

Accuracy: $\pm 1 \text{ digit} \pm \text{time base error}$

Maximum input voltage without damage: $260 \text{ V}_{\text{rms}}$ at 10 Hz and $12 \text{ V}_{\text{rms}}$ at 80 MHz. See also graph in section 3

Input attenuation: automatically and continuously variable from $\times 1$ to $\times 50$

Sensitivity: $20 \text{ mV}_{\text{rms}}$. See also graph in section 3

2.2. Measurement PM 6664

Frequency range: 10 Hz to 520 MHz

Gate time: 1 s

Resolution: 1 Hz for frequencies up to approximately 70 MHz and 10 Hz for frequencies above 70 MHz

Input impedance: $1 \text{ M}\Omega//25 \text{ pF}$. See also the graph in section 13

Sensitivity: $20 \text{ mV}_{\text{rms}}$. See also graph in section 3

Coupling: ac

AM tolerance: 30 % from 10 Hz to prescaler switch on frequency. 95 % from prescaler switch on frequency to 520 MHz at a f_{mod} of 5 kHz or less

Accuracy: $\pm 1 \text{ digit} \pm \text{time base error}$

Maximum input voltage without damage: $260 \text{ V}_{\text{rms}}$ at 10 Hz and $12 \text{ V}_{\text{rms}}$ at 520 MHz. See also the graph in section 3

Input attenuation: automatically and continuously variable from $\times 1$ to $\times 50$

Prescaler switch over: on at approximately 70 MHz and off at approximately 60 MHz

2.3. Time base characteristics PM 6661

Frequency: 2^{22} Hz

Ageing: less than $2 \times 10^{-6}/\text{year}$

Temperature stability $0^\circ\text{C} \dots 50^\circ\text{C}$: less than 1.5×10^{-5} with reference to 25°C

2.4. Time base characteristics PM 6664/01

Frequency: 2^{22} Hz

Ageing: less than $2 \times 10^{-6}/\text{year}$

Temperature stability $0^\circ\text{C} \dots 50^\circ\text{C}$: less than 1.5×10^{-5} with reference to 25°C

2.5. Time base characteristics PM 6664/02

Frequency: 2^{23} Hz

Ageing: less than $1 \times 10^{-7}/\text{month}$

Temperature stability $0^\circ\text{C} \dots 50^\circ\text{C}$: less than 1×10^{-6} with reference to $+25^\circ\text{C}$

2.6. Environmental characteristics

Storage temperature: $-40^\circ\text{C} \dots +70^\circ\text{C}$

Operating temperature: $0^\circ\text{C} \dots +45^\circ\text{C}$

Storage altitude: 15.000 m (15.2 kN/m^2)

Operating altitude: 5.000 m (53.3 kN/m^2)

Humidity: 10 % .. 90 % RH (26°C dew point)

Vibration: according to IEC 68 Fc

Bump: according to IEC 68 Eb

Handling: according to IEC 68 Ec

Transport: according to NLN-L88

Width: 145 mm

Height: 45 mm

Depth: 220 mm

Weight PM 6661: 1400 g

Weight PM 6664: 1500 g

3. Performance check

3.1. Frequency check

— Connect the signal from TP9 to the input socket of the counter via a $10 \text{ M}\Omega//11 \text{ pF}$ probe.

— Check that counter displays $4.194304 \text{ MHz} \pm 1 \text{ Hz}$.

3.2. Sensitivity check PM 6661

— Connect signal source output to the input socket of the counter via a 50Ω feedthru resistor.

— Vary signal frequency from 50 Hz to 70 MHz. Counter should display the input frequency correctly at an input level of $20 \text{ mV}_{\text{rms}}$.

— Set the signal source to 10 Hz and check that the counter displays the input frequency correctly at an input level of $100 \text{ mV}_{\text{rms}}$.

— Set the signal source to 80 MHz and check that the counter displays the input frequency correctly at an input level of $28 \text{ mV}_{\text{rms}}$.

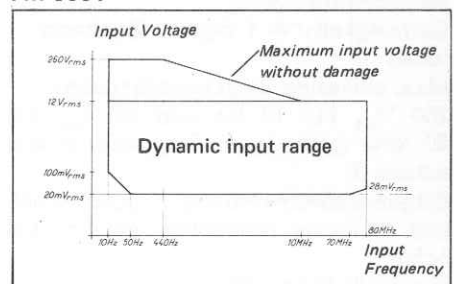
3.3. Sensitivity check PM 6664

— Connect signal source output to the input socket of the counter via a 50Ω feedthru resistor.

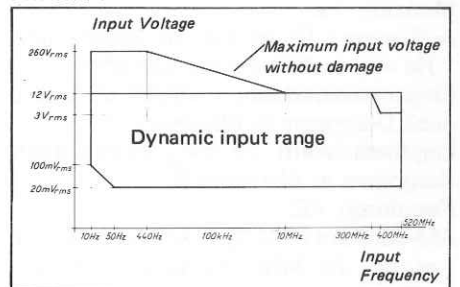
— Vary signal frequency from 50 Hz to 520 MHz. Counter should display the input frequency correctly at an input level of $20 \text{ mV}_{\text{rms}}$.

— Set the signal source to 10 Hz and check that the counter displays the input frequency correctly at an input level of $100 \text{ mV}_{\text{rms}}$.

PM 6661



PM 6664



4. Accessories

4.1. Standard accessoires supplied with the instrument

1 mains cable and 1 manual

4.2. Accessories to be ordered separately

PM 9665 B: 50 kHz low pass filter
PM 9669/09: panel mount adapter
PM 9585: $50 \Omega/1 \text{ W}$ feed-through termination

1. Einleitung

Die Modelle PM 6661 und PM 6664 sind achtstellige Frequenzzähler mit automatischer Triggerung und Eingangsabschwächung. Sie ermöglichen Frequenzmessungen im Bereich von 10 Hz bis 80 MHz (PM 6661) bzw. von 10 Hz bis 520 MHz (PM 6664). Die Empfindlichkeit beträgt $20 \text{ mV}_{\text{eff}}$. Konstruktion und Schaltung dieser Geräte werden ständig weiterentwickelt und verbessert. Sie können daher geringfügig von den Angaben in dieser Bedienungsanleitung abweichen.

2. Technische Daten

2.1. Messungen PM 6661

Frequenzbereich: 10 Hz bis 80 MHz
Meßzeit: 1 s
Auflösung: 1 Hz
Eingangsimpedanz: $1 \text{ M}\Omega/18 \text{ pF}$
Kopplung: AC
AM-Toleranz: 30 %
Genauigkeit: $\pm 1 \text{ digit} \pm \text{Zeitbasisfehler}$
Max. zulässige Eingangsspannung: $260 \text{ V}_{\text{eff}}$ bei 10 Hz und $12 \text{ V}_{\text{eff}}$ bei 80 MHz (siehe auch Diagramm in Abschnitt 3)
Eingangsabschwächung: automatisch und stufenlos einstellbar von $\times 1$ bis $\times 50$
Empfindlichkeit: $20 \text{ mV}_{\text{eff}}$ (siehe auch Diagramm in Abschnitt 3)

2.2. Messungen PM 6664

Frequenzbereich: 10 Hz bis 520 MHz
Meßzeit: 1 s
Auflösung: 10 Hz bis ca. 70 MHz und 1 Hz von ca. 70 MHz bis 520 MHz.
Eingangsimpedanz: $1 \text{ M}\Omega/25 \text{ pF}$ (siehe auch Diagramm in Abschnitt 13)
Empfindlichkeit: $20 \text{ mV}_{\text{eff}}$ (siehe auch Diagramm in Abschnitt 3)
Kopplung: AC
AM-Toleranz: 30 % zwischen 10 Hz und ca. 70 MHz (Vorteiler-Einschaltung).
 95 % zwischen ca. 70 MHz (Vorteiler-Einschaltung) und 520 MHz bei $f_{\text{mod}} = \text{max. } 5 \text{ kHz}$
Genauigkeit: $\pm 1 \text{ digit} \pm \text{Zeitbasisfehler}$
Max. zulässige Eingangsspannung: $260 \text{ V}_{\text{eff}}$ bei 10 Hz und $12 \text{ V}_{\text{eff}}$ bei 520 MHz (siehe auch Diagramm in Abschnitt 3)
Eingangsabschwächung: automatisch und stufenlos einstellbar von $\times 1$ bis $\times 50$
Vorteiler-Umschaltung: Einschaltung bei ca. 70 MHz und Abschaltung bei ca. 60 MHz

2.3. Zeitbasis-Kenndaten PM 6661

Frequenz: 2^{22} Hz
Alterung: unter 2×10^{-6} pro Jahr
Temperaturabweichung 0°C bis 50°C : unter $1,5 \times 10^{-5}$ bezogen auf 25°C

2.4. Zeitbasis-Kenndaten PM 6664/01

Frequenz: 2^{22} Hz
Alterung: unter 2×10^{-6} pro Jahr
Temperaturabweichung 0°C bis 50°C : unter $1,5 \times 10^{-5}$ bezogen auf 25°C

2.5. Zeitbasis-Kenndaten PM 6664/02

Frequenz: 2^{23} Hz
Alterung: unter 1×10^{-7} pro Monat
Temperaturabweichung 0°C bis 50°C : unter 1×10^{-6} bezogen auf 25°C

2.6. Umgebungsbedingungen
Lagertemperatur: -40°C bis $+70^\circ\text{C}$
Betriebstemperatur: 0°C bis $+45^\circ\text{C}$
Lagerhöhe: 15.000 m ($15,2 \text{ kN/m}^2$)
Betriebshöhe: 5.000 m ($53,3 \text{ kN/m}^2$)
Feuchtigkeit: 10 bis 90 % rel. Luftfeuchtigkeit (Taupunkt 26°C)
Vibrationsfestigkeit: nach IEC 68 Fc
Stoßfestigkeit: nach IEC 68 Eb
Bedienungstest: nach IEC 68 Ec
Transporttest: nach NLN-L88
Breite: 145 mm
Höhe: 45 mm
Tiefe: 220 mm
Gewicht PM 6661: 1400 g
Gewicht PM 6664: 1500 g

3. Funktionskontrolle

3.1. Frequenzprüfung

— Signal von TP9 über einen $10 \text{ M}\Omega/11 \text{ pF}$ Tastkopf an die Eingangsbuchse legen.
 — Kontrollieren, ob der Zähler 4.194304 MHz $\pm 1 \text{ Hz}$ anzeigt.

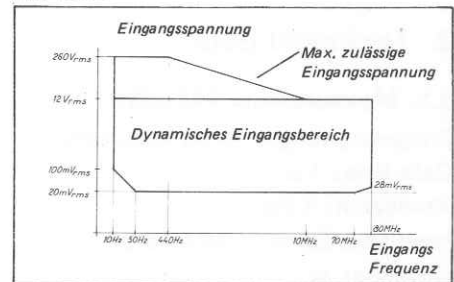
3.2. Empfindlichkeitsprüfung PM 6661

— Signalquelle über einen 50- Ω -Durchgangsabschluß an die Eingangsbuchse des Zählers legen.
 — Signalfrequenz von 50 Hz bis 70 MHz variieren. Der Zähler muß die Eingangsfrequenz bei einem Eingangspegel von $20 \text{ mV}_{\text{eff}}$ korrekt anzeigen.
 — Signalquelle auf 10 Hz einstellen und kontrollieren, ob der Zähler die Eingangsfrequenz bei einem Eingangspegel von $100 \text{ mV}_{\text{eff}}$ korrekt anzeigt.
 — Signalquelle auf 80 MHz einstellen und kontrollieren, ob der Zähler die Eingangsfrequenz bei einem Eingangspegel von $28 \text{ mV}_{\text{eff}}$ korrekt anzeigt.

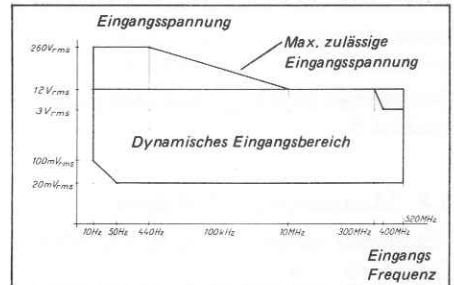
3.3. Empfindlichkeitsprüfung PM 6664

— Signalquelle über einen 50- Ω -Durchgangsabschluß an die Eingangsbuchse des Zählers legen.
 — Signalfrequenz von 50 Hz bis 520 MHz variieren. Der Zähler muß die Eingangsfrequenz bei einem Eingangspegel von $20 \text{ mV}_{\text{eff}}$ korrekt anzeigen.
 — Signalquelle auf 10 Hz einstellen und kontrollieren, ob der Zähler die Eingangsfrequenz bei einem Eingangspegel von $100 \text{ mV}_{\text{eff}}$ korrekt anzeigt.

PM 6661



PM 6664



4. Zubehör

4.1. Mitgeliefertes Standardzubehör

1 Netzkabel und 1 Bedienungsanleitung

4.2. Auf Bestellung lieferbares Zubehör

PM 9665 B: 50-kHz-Tiefpassfilter
PM 9669/09: Einbau-Adapter
PM 9585: 50- Ω -Durchgangsabschluß, 1 W

1. Introduction

Les PM 6661 et PM 6664 sont des compteurs-fréquences à 8 chiffres avec déclenchement automatique et atténuation d'entrée. La sensibilité est de 20 mV_{eff} et la gamme de fréquence de 10 Hz à 80 MHz pour le PM 6661, de 10 Hz à 520 MHz pour le PM 6664. Cet appareil est l'objet de développements et améliorations continus. En conséquence, certains détails mineurs peuvent différer des informations données dans la présente notice d'emploi et d'entretien.

2. Caractéristiques techniques

2.1. Mesures PM 6661

Gamme de fréquence : 10 Hz à 80 MHz

Temps de porte : 1 s

Résolution : 1 Hz

Impédance d'entrée : 1 MΩ/18 pF

Couplage : capacitif

Tolérance AM : 30 %

Précision : ± 1 impulsion ± erreur de base de temps

Tension maximale d'entrée sans dommage : 260 V_{eff} pour 10 Hz et 12 V_{eff} pour 80 MHz (regarder aussi graphique en section 3)

Atténuation d'entrée : Automatique et réglable de façon continue entre × 1 ... × 50

Sensibilité : 20 mV_{eff} (regarder aussi graphique en section 3)

2.2. Mesures PM 6664

Gamme de fréquence : 10 Hz à 520 MHz

Temps de porte : 1 s

Résolution : 10 Hz pour approx. fréquences à 70 MHz et 1 Hz pour fréquences au-dessus de 70 MHz

Impédance d'entrée : 1 MΩ/25 pF (regarder aussi graphique en section 9)

Sensibilité : 20 mV_{eff} (regarder aussi graphique en section 13)

Couplage : capacitif

Tolérance AM : 30 % de 10 Hz à la commutation du facteur de division (approx. 70 MHz). 95 % entre approx. 70 MHz et 520 MHz pour une fréquence de modulation ≤ 5 kHz

Précision : ± 1 impulsion ± erreur de base de temps

Tension maximale d'entrée sans dommage : 260 V_{eff} pour 10 Hz et 12 V_{eff} pour 520 Hz (regarder aussi la graphique en section 3)

Atténuation d'entrée : Automatique et réglable de façon continue entre × 1 ... × 50

Hystérésis du changement de gamme : Commutation du facteur de division vers 70 MHz, coupure vers 60 MHz

2.3. Caractéristiques de base de temps pour PM 6661

Fréquence : 2²² Hz

Usure : inférieure à 2 × 10⁻⁶/an

Déviations de température de 0°C à 50°C : inférieure à 1,5 × 10⁻⁵ par rapport à + 25°C

2.4. Caractéristiques de base de temps pour PM 6664/01

Fréquence : 2²² Hz

Usure : inférieure à 2 × 10⁻⁶/an

Déviations de température de 0°C à 50°C : inférieure à 1,5 × 10⁻⁵ par rapport à + 25°C

2.5. Caractéristiques de base de temps pour PM 6664/02

Fréquence : 2²³ Hz

Usure : inférieure à 1 × 10⁻⁷ par mois

Déviations de température de 0°C à 50°C : inférieure à 1 × 10⁻⁶/mois par rapport à + 25°C

2.6. Caractéristiques d'environnement

Température de stockage : - 40°C à + 70°C

Température de fonctionnement : 0°C à + 45°C

Altitude de stockage : 15.000 m (15,2 kN/m²)

Altitude de fonctionnement : 5.000 m (53,3 kN/m²)

Humidité : 10 à 90 % RH (26°C point requis)

Epreuve à la vibration : conforme à IEC 68 Fc

Epreuve au choc : conforme à IEC 68 Eb

Epreuve manipulation : conforme à IEC 68 Ec

Epreuve transportation : conforme à NLN-L88

Largeur : 145 mm

Hauteur : 45 mm

Profondeur : 220 mm

Poids PM 6661 : 1400 g

Poids PM 6664 : 150 g

3. Contrôle des performances

3.1. Contrôle de fréquence

— Connecter le signal du point TP9 à la douille d'entrée par l'intermédiaire d'une sonde 10 MΩ/11 pF pour oscilloscopes.

— Vérifier si l'affichage est

4.194304 MHz ± 1 Hz.

3.2. Contrôle de sensibilité pour PM 6661

— Connecter la source de signal à la douille d'entrée par l'intermédiaire d'une charge adaptée 50 Ω.

— Varier la fréquence de signal entre 50 Hz et 70 MHz. Le compteur doit indiquer la fréquence d'entrée correctement à un niveau d'entrée de 20 mV_{eff}.

— Mettre la source de signal à 10 Hz et vérifier que le compteur indique la fréquence d'entrée correctement à un niveau d'entrée de 100 mV_{eff}.

— Mettre la source de signal à 80 MHz et vérifier que le compteur indique la fréquence d'entrée correctement à un niveau d'entrée de 28 mV_{eff}.

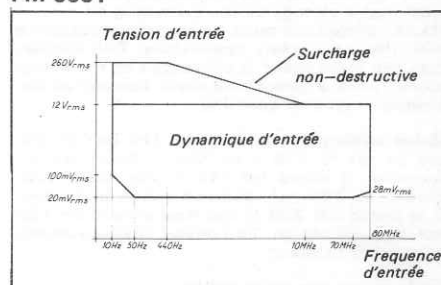
3.3. Contrôle de sensibilité pour PM 6664

— Connecter la source de signal à la douille d'entrée par l'intermédiaire d'une charge adaptée 50 Ω.

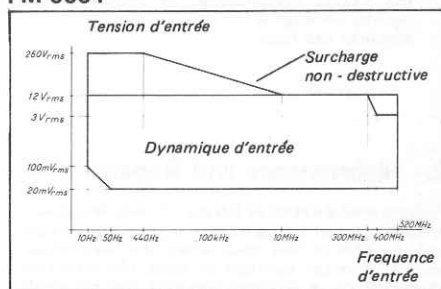
— Varier la fréquence de signal entre 50 Hz et 520 MHz. Le compteur doit indiquer la fréquence d'entrée correctement à un niveau d'entrée de 20 mV_{eff}.

— Mettre la source de signal à 10 Hz et vérifier que le compteur indique la fréquence d'entrée correctement à un niveau d'entrée de 100 mV_{eff}.

PM 6661



PM 6664



4. Accessoires

4.1. Accessoires standard (compris - la livraison)

1 cordon certeur

1 notice d'emploi et d'entretien

4.2. Accessoires sur option

PM 9665 B : Filtre passe-bas 50 kHz

PM 9669/09 : Adapteur pour montage panneau

PM 9585 : Charge adaptée 50 Ω, 1 W

Safety regulations

Upon delivery, the instrument complies with the required safety regulations. To maintain this condition and to ensure safe operation, it is recommended to follow the instructions below.

1. Before switching on

Protection The instrument is protected according to class 1 (protective earth) of the IEC 348 or VDE 0411. The mains cable provides earth connection. Outside specially protected rooms, the mains plug must be connected only to sockets with earthed contact. It is not allowed to interrupt the earth connection inside or outside the instrument.

Mounting The instrument may be used in any desired position. Do not place the instrument on any surface which produces or radiates heat, or in direct sunlight.

Earthing The instrument must be earthed in conformity with the local safety regulations. The mains cable delivered with the instrument includes a protective conductor, which is connected to the earth contacts of the plug. Thus, when connected to an earthed mains socket, the cabinet of the instrument is consequently connected to the protective earth. The circuit earth is connected internally to the external BNC socket and the cabinet. The BNC socket must not be used to connect a protective conductor. **Warning** Connect the mains cable plug only to a socket with protective earth contacts. This protection must not be ineffective e.g. by using an extension cable without earth protection.

Mains connection The instrument must be connected only to an AC supply. On delivery the instrument is set to 230 V or 115 V indicated on the plate at the rear of the instrument. Ensure that the instrument is set to the local mains voltage before switching on. Mains connection must be made in accordance with the local safety regulations. This implies that the instrument is connected to the mains socket with a protective earth contact as described in section Earthing.

Mains adjustment and Fuses The instrument can be set to 115 V or 230 V. When the instrument is wired for 115 V the mains fuse should be 200 mA delayed action and when it is wired for 230 V the fuse should be 100 mA delayed action. To convert the instrument proceed as follows:

- Unplug the mains cable
- Dismantle the instrument as described in section Dismantling
- Resolder the Black and Yellow wires from the Mains Transformer as shown in the figures on page 9
- Replace the fuse

2. Maintenance and Repair

Failure and Extensive Stress If the instrument is suspected of being unsafe take it out of operation. This is the case when the instrument shows physical damage or does not function anymore or is stressed beyond the tolerable limits e.g. during storage or transportation.

Dismantling the instrument When removing covers or other parts by means of tools, live parts or terminals could be exposed. Before opening the instrument, disconnect it from all power sources. If the open live instrument needs calibration, maintenance or a repair, it must be performed only by trained personnel being aware of the risks. After disconnection from all power sources, the capacitors in the instrument may remain charged for some seconds, observe the circuit diagrams. To dismantle the instrument proceed as follows:

- Unplug the mains cable
- Remove the two bottom screws
- Pull the cabinet backwards

Repair and replacing parts Repairs must be made by trained personnel. Ensure that the construction of the instrument is not altered to the detriment of safety. Above all, leakage paths, air gaps and insulation layers must not be reduced. When replacing, use only original parts. Other spare parts are only acceptable when the safety precautions for the instrument are not impaired.

Schutzmassnahmen

Dieses Gerät entspricht bei der Werksauslieferung den geltenden Schutzvorschriften. Zur Erhaltung dieses Zustands und zur Gewährleistung der Betriebssicherheit wird die genaue Einhaltung nachstehender Hinweise empfohlen.

1. Vor der Inbetriebnahme

Schutzart Das Gerät entspricht der Schutzklasse I (Schutzleiteranschluss) gemäss IEC 348 bzw. VDE 0411. Die Geräteanschlussleitung enthält einen Schutzleiter. Ausser in Räumen mit besonderen Schutzmassnahmen darf das Gerät nur an Steckdosen mit Schutzkontakten (Schuko-Steckdosen) angeschlossen werden. Jede Unterbrechung des Schutzleiters innerhalb oder ausserhalb des Geräts ist unzulässig.

Aufstellung Das Gerät ist für jede Betriebslage vorgesehen. Wärmeeinwirkung und direkte Sonneneinstrahlung sind zu vermeiden.

Erdung Das Gerät ist nach Massgabe der örtlichen Vorschriften zu erden. Der Schutzleiter der Geräteanschlussleitung ist an die Schutzkontakte des Steckers angeschlossen. Auf diese Weise ist das Gehäuse des Geräts zwangsläufig mit Erde verbunden. Das Masse-Potential steht mit der äusseren BNC-Buchse und dem Gehäuse in Verbindung. Der Anschluss des Schutzleiters an die BNC-Buchse ist nicht zulässig. **Zu beachten!** Netzstecker nur an Schuko-Steckdosen anschliessen. Diese Schutzmassnahme darf nicht unwirksam gemacht werden (z.B. durch Verwendung einer Verlängerungsschnur ohne Schutzleiter).

Netzanschluss Das Gerät ist nur für Betrieb an Wechselspannung vorgesehen. Werkmässig ist es auf die Spannung 230 V oder 115 V eingestellt (Typenschild auf der Geräterückwand beachten!). Bei Bedarf also erst auf die örtliche Netzspannung umschalten. Der Netzanschluss muss den örtlichen Schutzvorschriften entsprechen. In jedem Fall ist aber Anschluss über eine Steckvorrichtung mit Schutzkontakten erforderlich; siehe oben unter »Erdung«.

Spannungswahl und Sicherungen Das Gerät ist auf 115 V oder 230 V einstellbar. Erforderliche Sicherungen: 115 V – 200 mA (träge); 230 V – 100 mA (träge). Umschaltung wie folgt vornehmen:

- Netzstecker ziehen
- Gehäuse abnehmen (siehe unten)
- Gelben und schwarzen Draht am Netztransformator gemäss Skizze auf Seite 9 umlöten
- Sicherung wechseln

2. Wartung und Reparatur

Fehler und Überbeanspruchung Bei Verdacht der Betriebsunsicherheit Gerät aus dem Betrieb nehmen. Dies kann der Fall sein bei sichtbaren Beschädigungen, Funktionsausfall oder übermässigen Beanspruchungen (Transport, Lagerung und dgl.).

Abnehmen des Gehäuses Beim Entfernen von Abdeckungen und Bauteilen können unter Spannung stehende Teile freigelegt werden. Vor dem Öffnen ist das Gerät daher von allen Spannungsquellen zu trennen. Abstimmung, Wartung oder Reparaturen unter Spannung dürfen nur von geschulten Fachkräften, die mit den Gefahren vertraut sind, vorgenommen werden. **Zu beachten!** Auch nach Spannungsunterbrechung sind geladene Kondensatoren noch für einige Zeit spannungsführend (Schaltplan beachten!). Gehäuse wie folgt abnehmen:

- Netzstecker ziehen
- Beide Schrauben im Gehäuseboden lösen
- Gehäuse nach hinten abziehen

Reparaturen und Auswechslung von Teilen Reparaturen sind nur von Fachkräften auszuführen. Die Bauweise des Geräts darf unter keinen Umständen für den Geräteschutz nachteilig geändert werden. Insbesondere dürfen die Kriechstrecken, Sicherheitsabstände und Isolierschichten keinesfalls beeinträchtigt werden. Nur Originalersatzteile verwenden! Andere Ersatzteile sind nur zulässig, sofern sich daraus keine Nachteile für den Geräteschutz ergeben.

Prescriptions de sécurité

A la livraison, cet appareil satisfait aux normes de sécurité en vigueur. Afin de le maintenir conforme à ces normes et d'assurer son fonctionnement dans de bonnes conditions de sécurité, il est recommandé de se conformer aux instructions ci-dessous.

1. Avant la mise en marche

Protection L'appareil est protégé conformément à la classe 1 (ligne de terre protectrice) des normes IEC 348 ou VDE 0411. Son câble secteur comporte une connexion de terre. A l'extérieur des locaux spécialement protégés, ne connecter la fiche secteur qu'à des prises dotées d'un contact de terre. Toute interruption de la connexion de terre à l'intérieur ou à l'extérieur de l'appareil est proscrite.

Installation L'appareil peut être utilisé dans n'importe quelle position en fonction des besoins de l'utilisateur. Ne pas le placer sur une surface produisant ou rayonnant de la chaleur, ni à la lumière solaire directe.

Mise à la terre Mettre l'appareil à la terre conformément aux normes de sécurité locales en vigueur. Le câble secteur livré avec l'appareil comprend un conducteur protecteur relié aux contacts de terre de la fiche. Lorsqu'il est branché à une prise secteur avec terre, l'appareil a ainsi son coffret relié à la ligne de terre protectrice, laquelle est connectée intérieurement à la prise BNC externe du coffret. Ne pas utiliser cette dernière pour connecter un conducteur de protection.

Attention Ne brancher la fiche du câble secteur qu'à des prises dotées de contacts de terre. Ne pas neutraliser cette protection en utilisant par exemple un prolongateur sans conducteur de terre.

Branchement au secteur N'alimenter l'appareil qu'en courant alternatif. A sa livraison, il est couplé pour 230 V ou 115 V suivant l'indication de la plaquette placée à sa partie arrière. Bien s'assurer qu'il est couplé sur la tension secteur locale avant de le mettre en marche. La connexion de l'appareil au secteur devant être effectuée conformément aux normes locales de sécurité, elle doit comporter une ligne de terre protectrice comme décrit au chapitre Mise à la terre.

Sélection du secteur et fusibles L'appareil peut être couplé pour 115 V ou 230 V. Il doit comporter un fusible secteur de calibre 200 mA avec temporisation s'il est câblé pour être alimenté en 115 V ou de calibre 100 mA avec temporisation s'il est câblé pour être alimenté en 230 V. Pour modifier le couplage de l'appareil, procéder de la manière suivante:

- Débrancher le câble secteur
- Ouvrir l'appareil comme décrit au chapitre Ouverture
- Ressouder le fil noir et le fil jaune du transformateur secteur conformément aux figures à la page 9
- Remplacer le fusible

2. Maintenance et réparation

Défauts et contraintes sévères Si la sécurité de fonctionnement de l'appareil est jugée incertaine, le retirer du service. C'est notamment le cas lorsqu'il présente des dommages matériels ou ne fonctionne plus ou encore a été soumis à des contraintes hors tolérances, par exemple lors de l'entreposage ou du transport.

Ouverture de l'appareil Lors de l'enlèvement des capots ou autres parties au moyen d'outils, des organes ou des bornes sous tension peuvent se trouver exposés. Avant d'ouvrir l'appareil, le déconnecter par conséquent de toute source d'alimentation. Si l'appareil ouvert et sous tension nécessite un calibrage, une opération de maintenance ou une réparation, ne confier le travail qu'à du personnel qualifié et conscient des risques encourus. Après déconnexion des sources d'alimentation, les condensateurs de l'appareil peuvent rester chargés pendant quelques secondes, voir les schémas de connexions. Pour ouvrir l'appareil, procéder de la manière suivante:

- Débrancher le câble secteur
- Enlever les deux vis du fond
- Tirer le coffret vers l'arrière

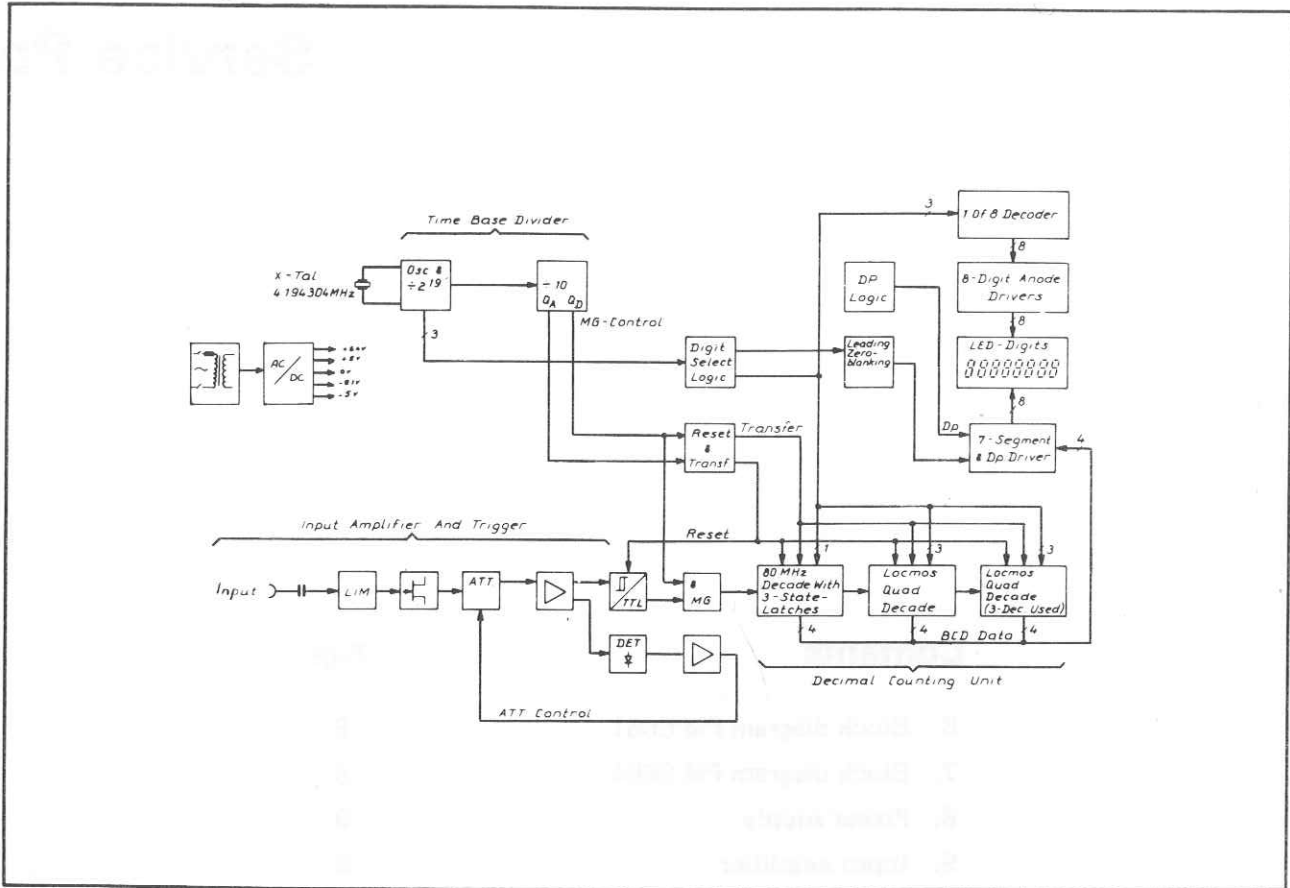
Réparation et remplacement de pièces Les réparations doivent être effectuées par du personnel qualifié. S'assurer que la constitution de l'appareil n'est pas modifiée au détriment de la sécurité. Avant tout, les lignes de fuite, les entrefers et les revêtements isolants ne doivent pas être réduits. Pour tout échange, n'utiliser que des pièces détachées d'origine. Les autres pièces de rechange ne sont acceptables que si le niveau de sécurité de l'appareil reste inchangé.

Service Part

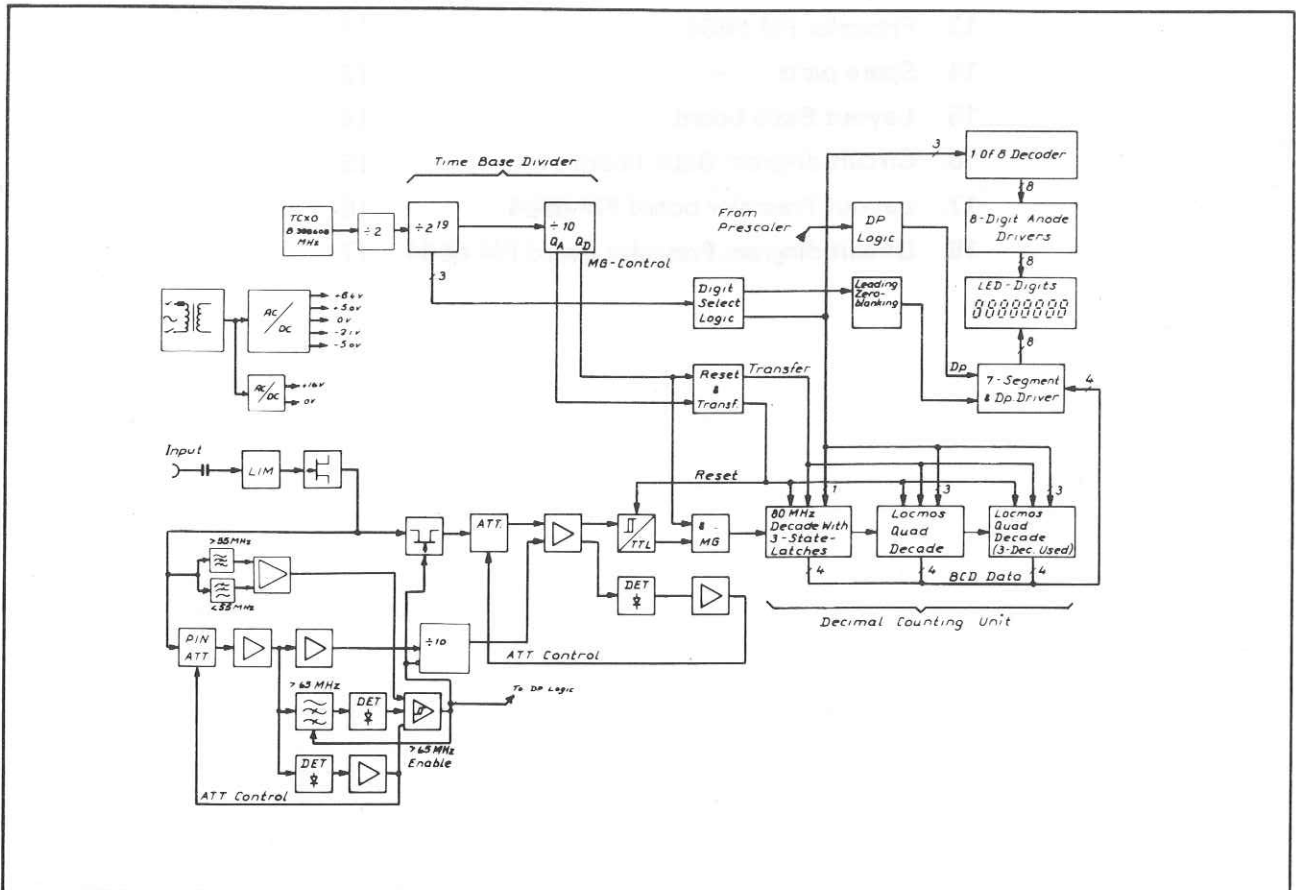
Contents

	Page
6. Block diagram PM 6661	8
7. Block diagram PM 6664	8
8. Power supply	9
9. Input amplifier	9
10. Oscillator PM 6661 and PM 6664/01	9
11. Decimal counting	9
12. Display and drivers	9
13. Prescaler PM 6664	11
14. Spare parts	12
15. Layout Basic board	14
16. Circuit diagram Basic board	15
17. Layout Prescaler board PM 6664	16
18. Circuit diagram Prescaler board PM 6664	17

6. Block diagram PM 6661



7. Block diagram PM 6664



8. Power supply

Test conditions

The d.c. voltages in the circuit diagram are typical and vary between instruments.

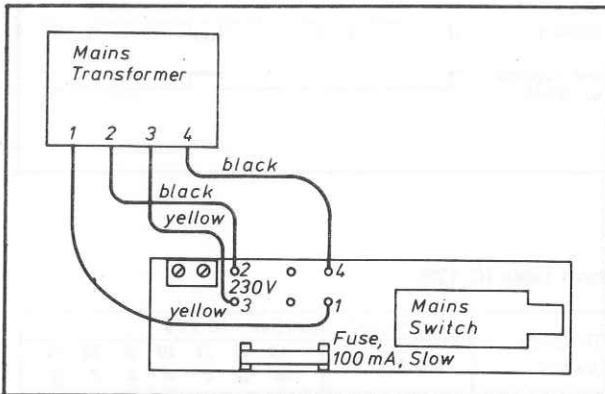
The voltages are measured without input signal and related to earth.

The test instrument shall have an input impedance of at least 40 k ohm/V

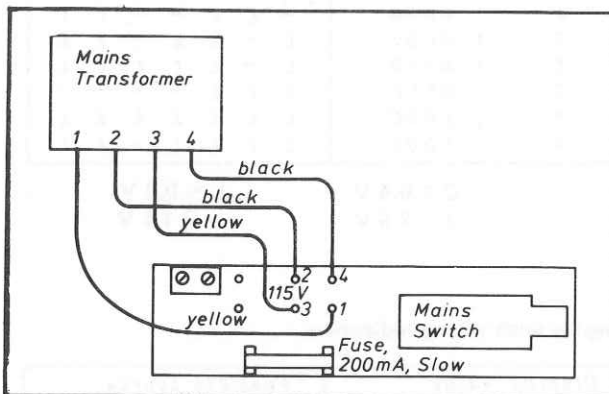
Test points

Test point	Nominal voltage (V)	Measured voltage (V)	Ripple mV
TP1	+6.4	+6.2...6.6	50
TP2	+5	+4.75...5.25	5
TP3	0	0	
TP4	-2.1	-1.9...-2.3	5
TP5	-5	-4.8...-5.2	2

230 V connection



115 V connection



9. Input amplifier

Test conditions

All d.c. voltages were measured without input signal with a voltmeter with an input resistance of 1 M ohm

Unless otherwise stated pulses were measured with input signal from TP9 connected to the input of the counter via a 10 M ohm/11 pF oscilloscope probe.

All voltages are typical and vary between instruments.

DC balance adjustment

- Connect a voltmeter between terminals 2 and 3 of IC 111 and adjust R 128 to $0V \pm 50$ mV.
- Interconnect terminals 3 and 7 of IC 405 (PM 6664 only)
- Disconnect the voltmeter and connect a 80 MHz/20mV_{rms} sine wave signal to the input socket of the counter.
- Vary the input frequency and readjust R 128 to highest possible frequency read out.
- Disconnect terminals 3 and 7 of IC 405 (PM 6664 only)

AGC check

- Connect a 1 kHz/5 mV_{rms} sine wave signal to the input socket of the counter.
- Connect a voltmeter to TP7 and check that the read out is -2 V to -3 V.
- Observe the display and increase the amplitude of the input signal until the display read out becomes correct and stable.
- Note the amplitude of the input signal (U1).
- Observe the voltmeter and increase the amplitude of the input signal until the voltmeter read out becomes positive.
- Note the amplitude of the input signal (U2).
- Check that the ratio $U2/U1$ is between 2...3.
- Repeat the procedure at 50 MHz.

10. Standard oscillator

Oscillator frequency adjustment PM 6661 and PM 6664/01

- Connect a counter with an accuracy better than 10^{-6} to TP 9.
- Adjust C 132 to 4.194304 MHz.

11. Decimal counting

Quad decade IC 125 and IC 126

The Quad Decade contains four separate decades and a flip-flop, in this application the flip-flop is not used. The Preset Input is a common input for the decades, a High level applied to this input will preset all decades to 19999.

The Reset Input is also a common input and a High level applied to this input will reset all decades to zero.

The Count Input is an exclusive input for the first decade, the signal to be counted is applied to this input. Each decade has a Carry Output which is connected to the Carry Input of the following decade.

All carry signals except from the first decade are available

for measurement, in this application only Carry 10 000 is used.

The carry signal is active Low and its pulse width is equal to the repetition time of the signal at the Count Input.

Each decade has also a BCD output and a Latch. The latch is a memory where the BCD information from the decades are stored.

The Transfer Input is a common input for the latches, a High Level applied to this input will open all latches and feed the BCD information stored in the latches to the multiplexer.

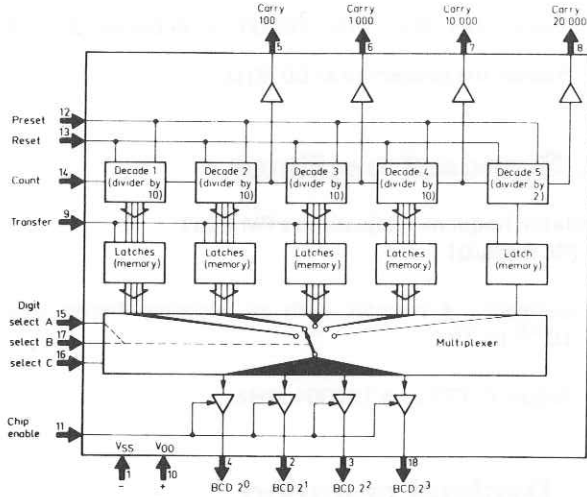
The Multiplexer is a programmable selector, the signals applied at the digit select inputs determines which latch the multiplexer will select, in this application input C is not used.

The BCD output is a tri state output, it can be logic 1, logic 0 or high-ohmic.

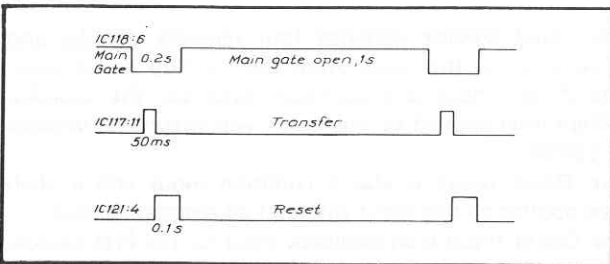
A High Level at Chip Enable Input will allow the multiplexer pass the BCD information in the preselected latch to the BCD output, a Low level makes the output high-ohmic.

Digit select A	Digit select B	Decade selection
L	L	Decade 1
H	L	Decade 2
L	H	Decade 3
H	H	Decade 4

Block diagram Quad decade



Timing diagram



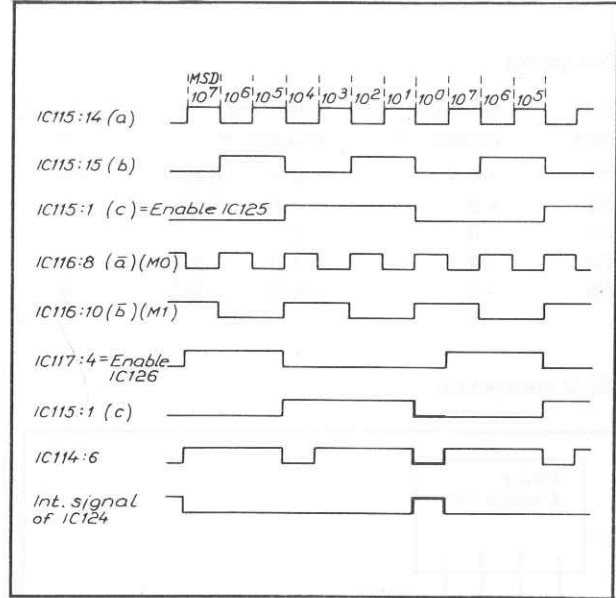
The timing diagram was measured without input signal with a two channels oscilloscope triggered on the main gate signal at IC 118:6.

12. Display and Drivers

Test conditions

The timing diagram was measured without input signal with a two channels oscilloscope triggered on IC 117:4 or IC 115:1.

Timing diagram



Truth table IC 129

Display digit	Terminal number IC 129										
	6	2	1	7	13	12	11	10	9	15	14
	a	b	c	d	e	f	g				
0	L	L	L	L	L	L	L	L	L	L	L
1	-	L	L	-	-	-	-	-	-	-	-
2	L	L	-	L	L	-	-	L	-	-	-
3	L	L	L	L	-	-	-	-	-	L	-
4	-	L	L	-	-	-	L	L	-	-	-
5	L	-	L	L	-	-	L	L	-	-	-
6	L	-	L	L	L	L	L	L	L	-	-
7	L	L	L	-	-	-	-	-	-	-	-
8	L	L	L	L	L	L	L	L	L	L	L
9	L	L	L	L	-	-	-	-	-	L	L

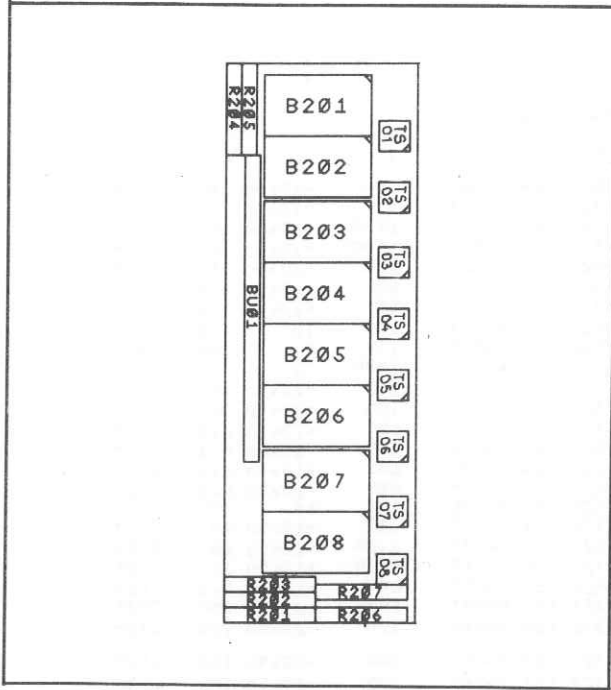
0 < 0.4 V L ≈ 0.4 V
1 > 2.5 V - ≈ 1.5 V

Display with wrong indication

Display value	Possible source of error
7 6.5 4 3.2 1 8	O.K.
■ ■ ■ 4 3.2 1 8	IC 126
7 6.5 ■ ■ ■ ■ 8	IC 125
7 6.5 4 3.2 1 ■	IC 124
7 6 5 4 3 2 1 8	IC 128
7 ■ 5 4 3.2 1 8	TS 207
7 6.5 ■ 3.2 1 8	TS 205
■ ■ ■ ■ ■ ■ ■ 8	IC 126 or IC 121
	IC 119 - 122 - 129
	or input ampl.
1 6.5 4 3.2 1 8	IC 129, R 201

■ no read out

Display board



Frequency adjustment of the TCXO (PM 6664/02)

This adjustment requires a reference oscillator having an accuracy of 10^{-7} or better.

The oscillator must have been operating for at least 1 hour before any adjustment is made.

- Connect the reference signal to the input socket of the counter.
- Adjust C 427 until the display shows the frequency of the reference oscillator ± 1 Hz.

HF and LF Comparator adjustment.

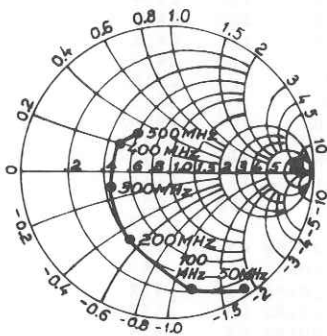
- Adjust R 445 until output 6 of IC 407 goes from high to low.
- Connect a voltmeter between - 5V and the slide contact of R445.
- Note the voltmeter read out and adjust R445 until the voltmeter read out has increased + 2V.

C441 and C442 are set to 55 MHz at the factory and need no readjustment.

13. Prescaler PM 6664

Input impedance PM 6664

At frequencies up to 10 MHz and an input voltage up to 500 mV the input impedance is 1 M ohm//25 pF.
 At frequencies below 200 MHz a 50 ohm input impedance can be obtained with the optional 50 ohm feed-through termination PM 9585.



Typical input impedance characteristic of PM 6664 normalized to 50 ohm

VSWR in a 50 ohm system

Frequency (MHz)	200	200	400	500
VSWR	2.5:1	3:1	2:1	2:1
	(with PM 9585)			

14. Spare parts

Resistors

Ordering no	Ω	%	Type	Item
4822 110 63065	27	5	CR25	R1
4822 110 63083	120	5	CR25	R101
4822 110 63105	820	5	CR25	R102
4822 110 63089	220	5	CR25	R103
4822 110 63178	470K	5	CR25	R112
4822 110 63094	330	5	CR25	R117
4822 110 63081	100	5	CR25	R118
4822 110 63081	100	5	CR25	R120
4822 110 63081	100	5	CR25	R121
4822 110 63134	10K	5	CR25	R122
4822 110 63081	100	5	CR25	R123
4822 110 63152	47K	5	CR25	R124
4822 110 63089	220	5	CR25	R125
4822 110 63089	220	5	CR25	R126
4822 110 63143	22K	5	CR25	R127
5322 100 10113	10K	20	TRIM	P128
4822 110 63118	2.7K	5	CR25	R129
4822 110 63116	2.2K	5	CR25	R130
4822 110 63125	4.7K	5	CR25	P131
4822 110 63116	2.2K	5	CR25	R132
4822 110 63125	4.7K	5	CR25	R133
4822 110 63167	180K	5	CR25	P134
4822 110 63167	180K	5	CR25	P135
4822 110 63085	150	5	CR25	R136
4822 110 63094	330	5	CR25	R137
4822 110 63089	220	5	CR25	P138
4822 110 63094	330	5	CR25	R139
4822 110 63101	560	5	CR25	R140
4822 110 63214	10M	10	CR25	R141
4822 110 63152	47K	5	CR25	R142
4822 110 63152	47K	5	CR25	R143
4822 110 63081	100	5	CR25	R144
4822 110 63081	100	5	CR25	R145
4822 110 63134	10K	5	CR25	P146
4822 110 63134	10K	5	CR25	R147
4822 110 63178	470K	5	CR25	R148
4822 110 63187	1M	5	CR25	R149
4822 110 63134	10K	5	CR25	R150
4822 110 63107	1K	5	CR25	R151
4822 110 63152	47K	5	CR25	R152
4822 110 63152	47K	5	CR25	R153
4822 110 63152	47K	5	CR25	R154
4822 110 63152	47K	5	CR25	R155
4822 110 63085	150	5	CR25	R156
4822 110 63094	330	5	CR25	R157
4822 110 63116	2.2K	5	CR25	R158
4822 110 63107	1K	5	CR25	R159
4822 110 63081	100	5	CR25	R201-07
4822 110 63098	470	5	CR25	R401
4822 110 63116	2.2K	5	CR25	R402
4822 110 63147	33K	5	CR25	R403
4822 110 63125	4.7K	5	CR25	R404
4822 110 63096	390	5	CR25	R405
4822 110 63149	39K	5	CR25	R406
4822 110 63147	33K	5	CR25	R407
4822 110 63138	15K	5	CR25	R408
4822 111 30324	100	5	CR16	R409
4822 110 63107	1K	5	CR25	R410
4822 110 63138	15K	5	CR25	R411
4822 110 63134	10K	5	CR25	R412
4822 110 63141	18K	5	CR25	R413
4822 110 63161	100K	5	CR25	R414
4822 110 63134	10K	5	CR25	R415
4822 110 63103	680	5	CR25	R416
4822 110 63134	10K	5	CR25	R417
4822 110 63112	1.5K	5	CR25	R418
4822 111 30269	1K	5	CR16	R419
4822 110 63169	220K	5	CR25	R420
5322 111 44153	15	5	CR16	R421
4822 111 30272	680	5	CR16	R422
4822 111 30323	270	5	CR16	R423
4822 111 30264	2.7K	5	CR16	R424
4822 110 63101	560	5	CR25	R425
4822 111 30245	47	5	CR16	R426
4822 111 30347	10	5	CR16	R427
4822 110 63134	10K	5	CR25	R428
4822 110 63103	680	5	CR25	R429
4822 110 63107	1K	5	CR25	R430
4822 110 63101	560	5	CR25	R433
4822 110 63143	22K	5	CR25	R434
4822 110 63107	1K	5	CR25	R435
4822 110 63098	470	5	CR25	R436
4822 110 63089	220	5	CR25	R441
4822 110 63116	2.2K	5	CR25	R442
5322 116 54743	301K	1	MR25	R443
4822 110 63178	470K	5	CR25	R444
5322 101 14069	22K	20	POTM	R445
5322 116 54743	301K	1	MR25	R446
4822 110 63187	1M	5	CR25	R451
4822 110 63214	10M	5	CR25	R453
4822 116 51098	100	5	PR37	R455
4822 110 63098	470	5	CR25	R458
4822 110 63081	100	5	CR25	R459
4822 110 63089	220	5	CR25	R460

4822 110 63134	10K	5	CR25	R461
4822 110 63134	10K	5	CR25	R462
4822 110 63147	33K	5	CR25	R465
4822 110 63134	10K	5	CR25	R467
4822 110 63118	2.7K	5	CR25	R468
4822 110 63101	100K	5	CR25	R469

Capacitors

Ordering no	F	%	V	Item
4822 124 20586	150M	-10+50	16	C101
5322 124 14053	33M	-10+50	10	C102
4822 124 20525	1500M	-10+50	16	C103
4822 124 20525	1500M	-10+50	16	C104
4822 124 20525	1500M	-10+50	16	C105
5322 124 14079	68M	-10+50	6.3	C106
5322 124 14079	68M	-10+50	6.3	C107
4822 122 31173	220P	10	100	C112
4822 122 30045	27P	2	100	C113
5322 121 40323	100N	10	100	C114
5322 122 34041	10N	-20+50	100	C116
5322 122 34041	10N	-20+50	100	C117
5322 124 14079	68M	-10+50	6.3	C118
5322 124 14066	10M	-10+50	6.3	C119
5322 124 14079	68M	-10+50	6.3	C120
5322 124 14079	68M	-10+50	6.3	C121
4822 122 31175	1N	10	100	C122
5322 124 14053	33M	-10+50	10	C123
5322 124 14075	2.2M	-10+50	16	C124
5322 124 14075	4.7M	-10+50	10	C125
5322 124 14079	68M	-10+50	6.3	C126
5322 121 40323	100N	10	100	C127
5322 122 34041	10N	-20+50	100	C128
5322 122 34041	10N	-20+50	100	C129
5322 122 34041	10N	-20+50	100	C130
4822 122 31078	82P	2	100	C131
4822 125 50017	5.5-65P		100	C132
4822 122 31072	47P	2	100	C133
4822 122 31078	82P	2	100	C134
4822 122 31175	1N	10	100	C135
4822 122 31067	33P	2	100	C136
5322 122 34041	10N	-20+50	100	C137
4822 122 31067	33P	2	10	C138
4822 124 20461	47M	-10+50	10	C140
4822 122 31175	1N	10	100	C141
5322 122 34041	10N	-20+50	100	C142
5322 121 40323	100N	10	100	C143
5322 121 40323	100N	10	100	C144
4822 122 31067	33P	2	100	C401
4822 122 31072	47P	2	100	C402
4822 122 30043	10N	-20+80	63	C403
4822 122 31047	5.6P	2	100	C404
4822 122 30043	10N	-20+80	63	C405
4822 122 31173	220P	10	100	C406
4822 122 31173	220P	10	100	C407
4822 122 31072	47P	2	100	C408
4822 122 31175	1N	10	100	C409
4822 122 31067	33P	2	100	C410
4822 122 31072	47P	2	100	C411
4822 122 31063	22P	2	100	C412
4822 122 31175	1N	10	100	C413
4822 122 31173	220P	10	100	C414
4822 122 31173	220P	10	100	C415
4822 122 31177	470P	10	100	C416
4822 122 31175	1N	10	100	C417
4822 122 31072	47P	2	100	C418
4822 122 31072	47P	2	100	C419
4822 122 31175	1N	10	100	C420
4822 122 30043	10N	-20+80	63	C421
4822 122 31173	220P	10	100	C422
5322 124 14064	4.7M	-10+50	10	C425
4822 122 31067	33P	2	100	C426
5322 125 54003	5.5-65P		100	C427
4822 122 30043	10M	-20+80	63	C428
4822 124 20461	47M	-10+50	10	C431
4822 124 20461	47M	-10+50	10	C432
4822 122 30043	10N	-20+80	63	C433
4822 122 30043	10N	-20+80	63	C434
5322 125 54029	2-18P			C441
5322 125 54029	2-18P			C442
4822 122 30043	10N	-20+80	63	C443
5322 124 14079	68M	-10+50	6.3	C444
4822 122 30043	10N	-20+80	63	C445
4822 122 31067	33P	2	100	C446
5322 122 34045	0.33N	10	500	C451
4822 122 30045	27P	2	100	C453
5322 124 14079	68M	-10+50	6.3	C454
4822 122 30043	10N	-20+80	63	C455
4822 122 30043	10N	-20+80	63	C456
4822 122 30043	10N	-20+80	63	C457
4822 124 20529	1000M	-10+50	25	C458
4822 124 20529	1000M	-10+50	25	C459
4822 124 20586	150M	-10+50	16	C461
4822 124 20586	150M	-10+50	16	C462
4822 122 30043	10N	-20+80	63	C463

4822	122	30043	M	10N	-20+80	63	C464
4822	122	30043	M	10N	-20+80	63	C467
4822	122	31047	M	5.6P	?	100	C468
4822	122	31173	M	220P	10	100	C469
4822	122	31072	M	47P	?	100	C470
4822	122	31173	M	220P	10	100	C471
4822	122	31173	M	220P	10	100	C472
4822	122	31173	M	220P	10	100	C473
5322	124	14079		68M	-10+50	6.3	C474
4822	122	31047	M	5.6P	?	100	C475
5322	122	34043		47P	10	50	C476
5322	122	34043		47P	10	50	C477
5322	122	34043		47P	10	50	C478
5322	122	34043		47P	10	50	C479
4822	122	30043	M	10N	-20+80	63	C480
5322	122	34043		47P	10	63	C481

Transistors

Ordering no.	Type	Item
5322	130 44418	BF256A TS101
5322	130 40745	BFW92 TS102
4822	130 40937 M	BC5488 TS103
5322	130 44435	2N5770 TS104
5322	130 44435	2N5770 TS105
4822	130 40937 M	BC5488 TS106
5322	130 44593	BC369 TS201-07
4822	130 40937 M	BC5488 TS401
5322	130 40745	BFW92 TS402
5322	130 44179	BFR90 TS403
5322	130 44435	2N5770 TS404
5322	130 44418	BF256A TS405
5322	130 44418	BF256A TS406
5322	130 40745	BFW92 TS407

Diodes

Ordering no.	Type	Item
5322	130 30414	BY164 GR101
5322	130 30613	BAW62 GR102
5322	130 34047	BZX75-C1V4 GR104
5322	130 34049	BZX75-C2V1 GR105
5322	130 30594	BAV10 GR113
5322	130 30594	BAV10 GR114
5322	130 30594	BAV10 GR115
5322	130 30594	BAV10 GR116
5322	130 30594	BAV10 GR117
5322	130 34173	BZX79-C5V6 GR118
5322	130 30613	BAW62 GR121
5322	130 34364	BA379 GR401
5322	130 34364	BA379 GR402
5322	130 34364	BA379 GR403
5322	130 30613	BAW62 GR404
5322	130 34302	BA280 GR405
5322	130 34302	BA280 GP406
5322	130 34302	BA280 GR407
5322	130 34302	BA280 GR408
5322	130 30613	BAW62 GR409
5322	130 34302	BA280 GR411
5322	130 34302	BA280 GR412
5322	130 30613	BAW62 GR413
5322	130 34045	FD777 GR416
5322	130 34364	BA379 GR417
5322	130 30414	BY164 GR419
5322	130 34302	BA280 GR420
5322	130 30644	BA182 GR421
5322	130 30613	BAW62 GR422
5322	130 34047	BZX75-C1V4 GR423
5322	130 30613	BAW62 GR424
5322	130 34302	BA280 GP425

Integrated Circuits

Ordering no.	Type	Item
5322	209 84454	MC7805CP IC101
5322	209 85456	MC7905CP IC102
5322	209 84825	MC10216P IC111
5322	111 94015	6XJK IC112
5322	209 85254	SN72741P IC113
5322	209 14019	F34069PC IC114
5322	209 14022	F34040PC IC115
5322	209 14024	F34024PC IC116
5322	209 84976	F34001PC IC117
5322	209 14018	F34049PC IC118
5322	209 14021	F34050PC IC119
5322	209 85255	SN74LS90N IC120
5322	209 85312	SN74LS02N IC121
5322	209 85411	SN74S196N IC122
5322	111 94031	6X47K IC123
5322	209 14025	MC14076CP IC124

5322	209 84722	GZF1201P IC125
5322	209 84722	GZF1201P IC126
5322	209 14023	F34556PC IC127
5322	209 84167	SN74S00N IC128
5322	209 85457	SN74247N IC129
5322	209 84996	SN74LS10N IC130
5322	209 85578	N OM335 IC401
5322	209 85578	OM335 IC402
5322	209 85458	N 11C90DC FAIRCHILD IC403
5322	209 85254	SN72741P IC404
5322	209 85254	SN72741P IC405
5322	209 85254	SN74LS74N IC406
5322	209 85254	SN72741P IC407
5322	209 85577	N MA78M12UC IC408

Inductances

Ordering no.	Description	Item
5322	158 10243	INDUCTANCE 100MH 20% L101
5322	158 10243	INDUCTANCE 100MH 20% L102
5322	158 10289	INDUCTANCE 680NH 20% L103
4822	526 10025	FXC BEAD L104
4822	526 10025	FXC BEAD L105
5322	158 14119	COIL L401
5322	158 14119	COIL L402
5322	158 10276	INDUCTANCE 4.7MH L403
4822	526 10025 M	FXC BEAD L404
4822	526 10025 M	FXC BEAD L405
5322	157 44024	COIL L406
4822	526 10025 M	FXC BEAD L407
5322	158 14049	INDUCTANCE 150N 20% L408
4822	526 10025 M	FXC BEAD L409
5322	158 14049	INDUCTANCE 150NH L410
4822	526 10025 M	FXC BEAD L411
5322	158 10052	HF CHOKE L412
5322	158 10052	HF CHOKE L413
5322	158 10289	INDUCTANCE 680NH L415
5322	158 10289	INDUCTANCE 680NH L416
5322	158 10052	HF CHOKE L421
5322	158 10052	HF CHOKE L422

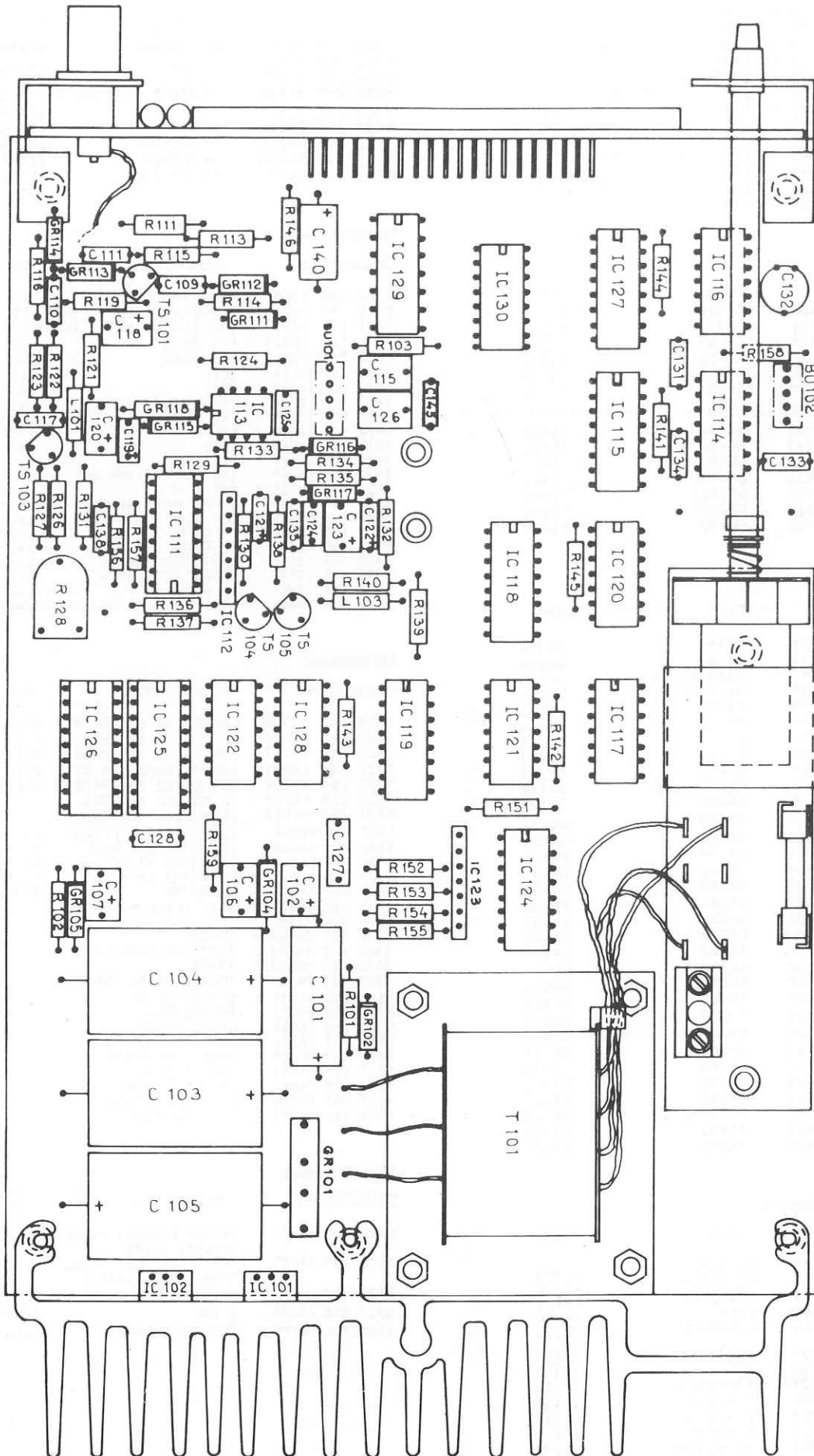
Mechanical

Ordering no.	Description	Item
5322	265 54006	CONNECTOR 10P FEMALE BU101
5322	265 54006	CONNECTOR 5P FEMALE BU102
5322	264 54017	CONNECTOR 20P MALE BU103
5322	267 10904	INPUT CONNECTOR BNC BU104
5322	265 54006	CONNECTOR 10P FEMALE BU105
5322	255 44107	IC HOLDER 16P OIL
5322	255 44112	IC HOLDER 18P OIL
5322	265 54006	CONNECTOR 10P FEMALE PO BU401
5322	265 64062	CONNECTOR 10P MALE PO BU401
5322	265 54006	CONNECTOR 5P FEMALE PO BU402
5322	265 64062	CONNECTOR 5P MALE PO BU402
5322	267 34043	CONNECTOR BV403
5322	456 14057 N	TEXT PLATE PM6661
5322	456 14058	TEXT PLATE PM6664
5322	459 24066 N	WINDOW
5322	462 44292 N	FOOT FCP CABINET
5322	460 64022 N	FRAME
5322	325 50101	HOLDER MAINS CABLE
5322	290 64175 N	CONNECTOR 2P
5322	256 34031	FUSEHOLDER
5322	276 14066	MAINS SWITCH
4822	253 20006 M	FUSE 220V 100MA
4822	253 20009 M	FUSE 110V 200MA
5322	414 14011	PUSH BUTTON
5322	535 94648	EXTENSION BAR
4822	492 60705 M	CLAMPING SPRING
5322	462 44291 N	CAP OVER FUSE

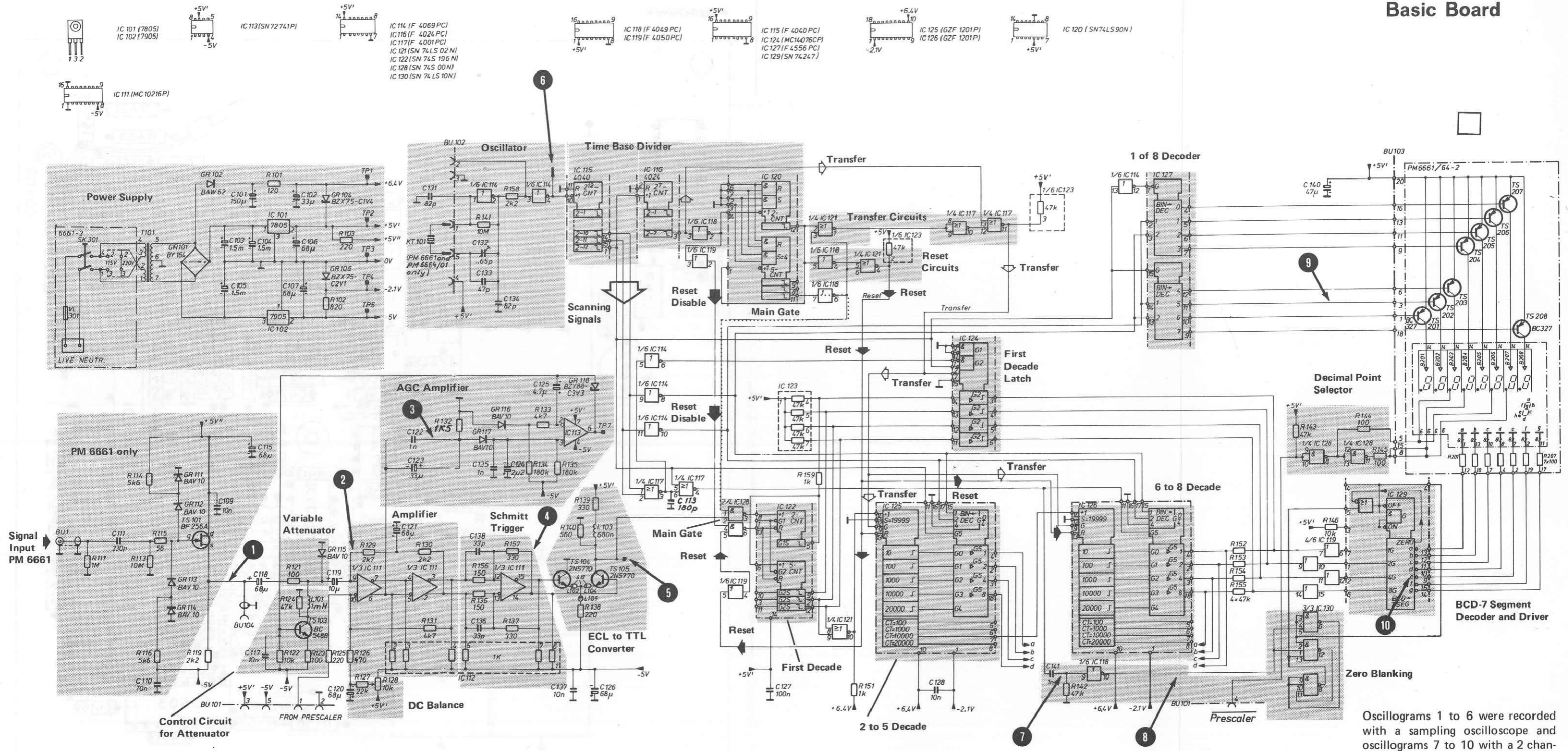
Miscellaneous

Ordering no.	Description	Item
5322	130 34524	7-SEGM DISPLAY MODUL PHILIPS CQY81
5322	209 85455	7-SEGM DISPLAY MODUL MONS.MANTZ CLASS C
5322	146 14125	MAINS TRANSFORMER T101
5322	242 74131	X-TAL KT101
5322	216 94174 N	TCXO 8388608HZ KT401

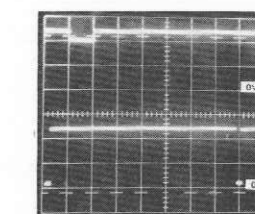
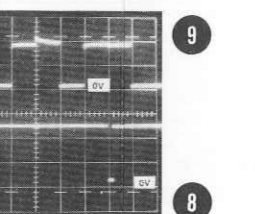
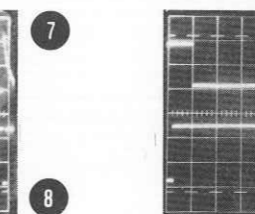
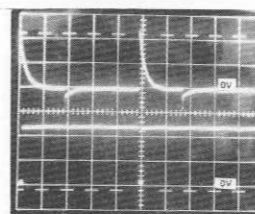
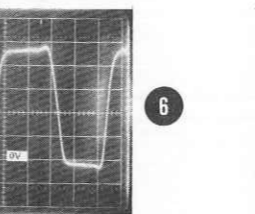
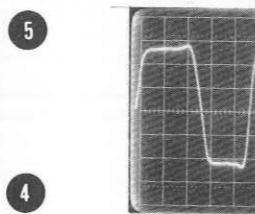
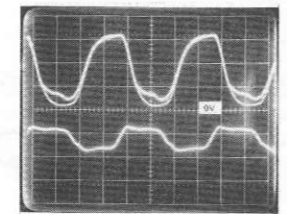
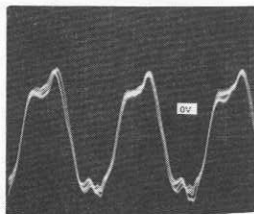
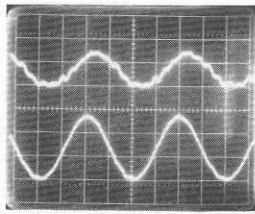
Basic Board



Basic Board



Oscillograms 1 to 6 were recorded with a sampling oscilloscope and oscillograms 7 to 10 with a 2 channels 10 MHz oscilloscope. The input was a 50 MHz/150 mVpp sine wave signal.



5ns/div
40mV/div

5ns/div
40mV/div

5ns/div
0V/div

50ns/div
1V/div

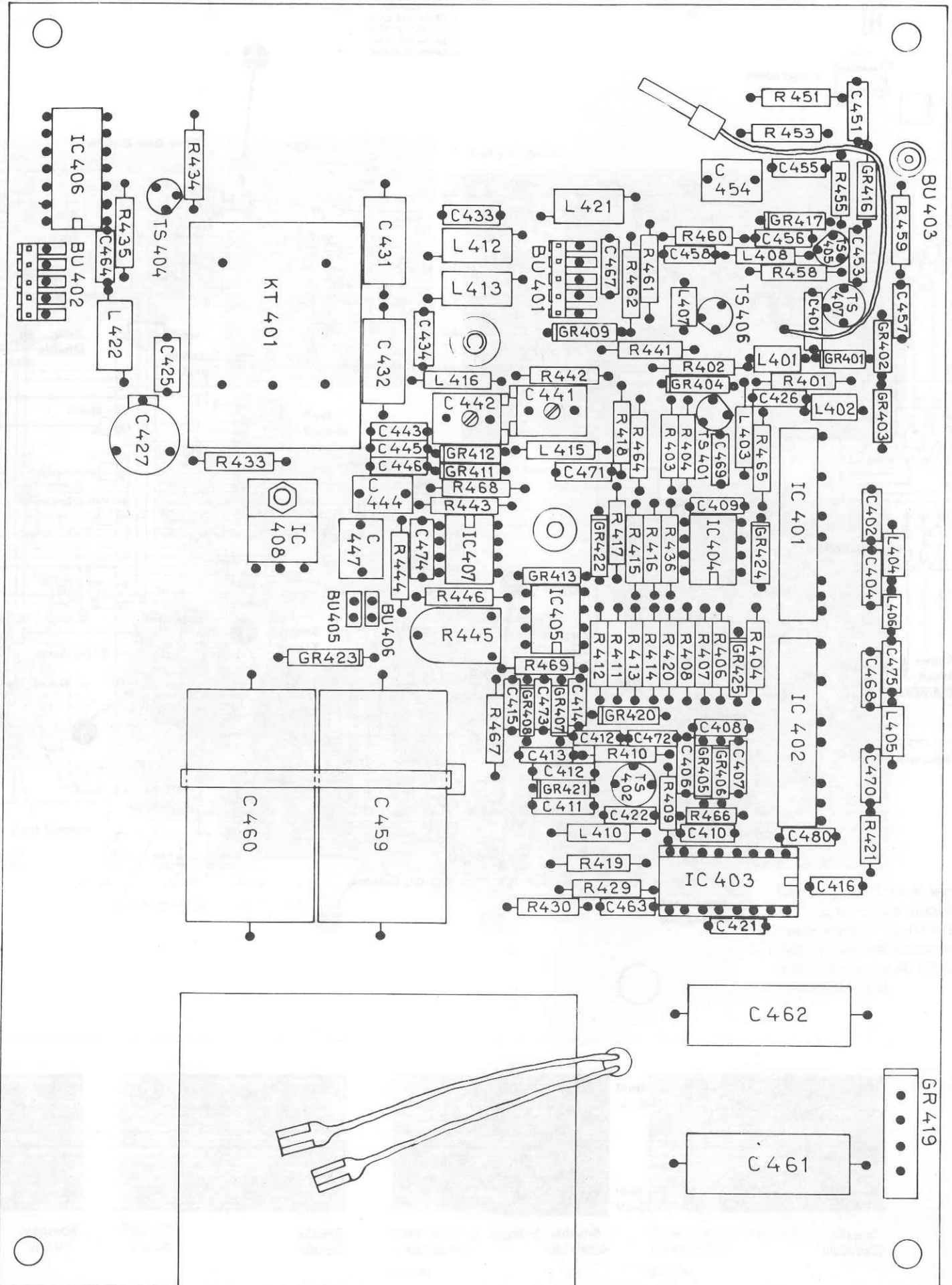
200µs/div
2V/div

Time base is adjusted to
1 decade/div
2V/div

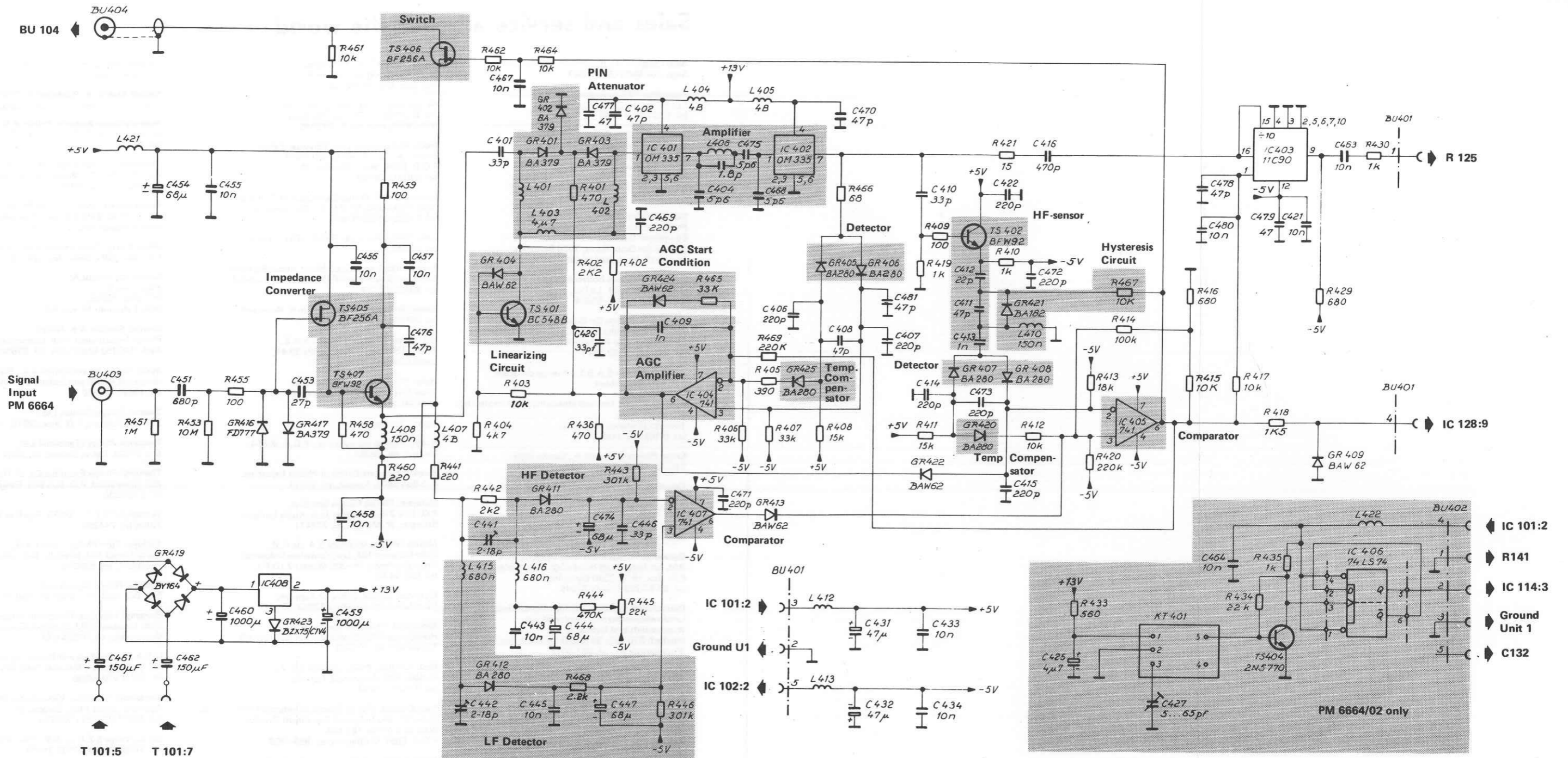
Time base is adjusted to
1 decade/div
2V/div

Time base is adjusted to
1 decade/div
2V/div

Prescaler



Prescaler



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CODING SYSTEM OF FAILURE REPORTING FOR QUALITY
ASSESSMENT OF T & M INSTRUMENTS
(excl. potentiometric recorders)

The information contents of the coded failure description is necessary for our computerized processing of quality data.

Since the reporting of repair and maintenance routines must be complete and exact, we give you an example of a correctly filled-out PHILIPS SERVICE Job sheet.

①	②	③	④																								
Country	Day Month Year	Typenumber /Version	Factory/Serial no.																								
<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 15px; height: 15px; text-align: center;">3</td><td style="width: 15px; height: 15px; text-align: center;">2</td></tr> </table>	3	2	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 15px; height: 15px; text-align: center;">1</td><td style="width: 15px; height: 15px; text-align: center;">5</td><td style="width: 15px; height: 15px; text-align: center;">0</td><td style="width: 15px; height: 15px; text-align: center;">4</td><td style="width: 15px; height: 15px; text-align: center;">7</td><td style="width: 15px; height: 15px; text-align: center;">5</td></tr> </table>	1	5	0	4	7	5	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 15px; height: 15px; text-align: center;">O</td><td style="width: 15px; height: 15px; text-align: center;">P</td><td style="width: 15px; height: 15px; text-align: center;">M</td><td style="width: 15px; height: 15px; text-align: center;">3</td><td style="width: 15px; height: 15px; text-align: center;">2</td><td style="width: 15px; height: 15px; text-align: center;">6</td><td style="width: 15px; height: 15px; text-align: center;">0</td><td style="width: 15px; height: 15px; text-align: center;">0</td><td style="width: 15px; height: 15px; text-align: center;">2</td></tr> </table>	O	P	M	3	2	6	0	0	2	<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 15px; height: 15px; text-align: center;">D</td><td style="width: 15px; height: 15px; text-align: center;">O</td><td style="width: 15px; height: 15px; text-align: center;">0</td><td style="width: 15px; height: 15px; text-align: center;">0</td><td style="width: 15px; height: 15px; text-align: center;">7</td><td style="width: 15px; height: 15px; text-align: center;">8</td><td style="width: 15px; height: 15px; text-align: center;">3</td></tr> </table>	D	O	0	0	7	8	3
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CODED FAILURE DESCRIPTION

⑤	⑥		⑦																																																																	
Nature of call	Location	Component/sequence no.	Category																																																																	
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			<p>Job completed <input checked="" type="checkbox"/></p> <p>Working time ⑧</p> <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr><td style="width: 15px; height: 15px; text-align: center;">1</td><td style="width: 15px; height: 15px; text-align: center;">2</td></tr> </table> Hrs	1	2																																																															
1	2																																																																			

Detailed description of the information to be entered in the various boxes:

- ① Country:

3	2
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 = Switzerland
- ② Day Month Year

1	5	0	4	7	5
---	---	---	---	---	---

 = 15 April 1975
- ③ Type number/Version

O	P	M	3	2	6	0	0	2
---	---	---	---	---	---	---	---	---

 = Oscilloscope PM 3260, version 02 (in later oscilloscopes this number is placed in front of the serial no)
- ④ Factory/Serial number

D	O	0	0	7	8	3
---	---	---	---	---	---	---

 = DO 783 These data are mentioned on the type plate of the instrument

- ⑤ Nature of call: Enter a cross in the relevant box
- ⑥ Coded failure description

Location

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These four boxes are used to isolate the problem area. Write the code of the part in which the fault occurs, e.g. unit no or mechanical item no of this part (refer to 'PARTS LISTS' in the manual).
Example: 0001 for Unit 1
 000A for Unit A
 0075 for item 75
If units are not numbered, do not fill in the four boxes; see Example Job sheet.

Component/sequence no.

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These six boxes are intended to pinpoint the faulty component.
A. Enter the component designation as used in the circuit diagram. If the designation is alfa-numeric, the letters must be written (starting from the left) in the two left-hand boxes and the figures must be written (in such a way that the last digit occupies the right-most box) in the four right-hand boxes.
B. Parts not identified in the circuit diagram:
990000 Unknown/Not applicable
990001 Cabinet or rack (text plate, emblem, grip, rail, graticule, etc.)
990002 Knob (incl. dial knob, cap, etc.)
990003 Probe (only if attached to instrument)
990004 Leads and associated plugs
990005 Holder (valve, transistor, fuse, board, etc.)
990006 Complete unit (p.w. board, h.t. unit, etc.)
990007 Accessory (only those without type number)
990008 Documentation (manual, supplement, etc.)
990009 Foreign object
990099 Miscellaneous

Category

--

- 0 Unknown, not applicable (fault not present, intermittent or disappeared)
- 1 Software error
- 2 Readjustment
- 3 Electrical repair (wiring, solder joint, etc.)
- 4 Mechanical repair (polishing, filing, remachining, etc.)
- 5 Replacement (of transistor, resistor, etc.)
- 6 Cleaning and/or lubrication
- 7 Operator error
- 8 Missing items (on pre-sale test)
- 9 Environmental requirements are not met

- ⑦ Job completed: Enter a cross when the job has been completed.
- ⑧ Working time: Enter the total number of working hours spent in connection with the job (excluding travelling, waiting time, etc.), using the last box for tenths of hours.

	1	2
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 = 1,2 working hours (1 h 12 min.)

Standard symbols for logic elements

Circuit	I.E.C.	DIN norm 40700	American standard	Boolecn function
AND				$X = AB$
OR				$X = A + B$
NAND				$X = \overline{AB}$
NOR				$X = \overline{A + B}$
NAND with one inverting input				$X = \overline{A}B$
NOR with one inverting input				$X = \overline{\overline{A} + B}$
INHIBIT GATE				$X = (A + B) \overline{C}$
EXCLUSIVE OR				$X = A\overline{B} + \overline{A}B$
COMPARATOR				$X = AB + \overline{A}\overline{B}$
Distributed AND				
Distributed OR				
DELAY				
FLIP-FLOP				