# Gunson®

## COLORTUNE

Fuel System Fault Diagnostic Chart


***Instructions***

*Please read carefully before proceeding to test your vehicle. The chart is divided into 3 sections and at the beginning of each one a Test Operation is given. Whilst the correct appearance of the combustion flame (that should be seen through Colortune is indicated in words and colours, these colours are only an indication since printing limitations do not allow the true appearance to be properly shown. Read the Colortune Instructions for use carefully. Then carry out the 3 tests (as necessary) but always in the order given, i.e. correct any fault in the first section, Test 1, before trying Test 2 and correct any fault in this section before trying Test 3.*

*Do not use Colortune for extended periods at high rpm as the heat range is softer than that of a running plug. This is in order to reduce fouling of the glass, hindering assessment of the combustion flame. This applies particularly to rotary (e.g. Wankel) air cooled and high performance engines.*

*On two-stroke engines the colours may have a slight red tinge. However the yellow will always be brighter than the blue as on other engines.*

# TEST 1

Adjust carburettor mixture (at normal engine idle speed) to show yellow (rich) initially, then weaken gradually to achieve bunsen blue (correct).

**Correct appearance of combustion during test**

Bright light emission - yellow — Light blue emission diminishes sharply - bunson blue

**Incorrect appearance and effect of faults during test**

| Steps | Type of Fuel System | Fuel System Fault | Notes |
|---|---|---|---|
| **1 At idle** Yellow cannot be achieved initially. In severe cases engine will not run steadily at low speeds. | **Fixed choke** or carburettor with separate idle circuit. | Blocked idle fuel jet or idle air bleed jet not screwed home firmly. | **1** Air leak at carb/manifold flange or engine/ manifold flange if confined to some cylinders. Fault in crankcase ventilation system.<br><br>**1 and 2** Slight variation between cylinders is common at idle due to imperfect manifold design - obtain blue in all cylinders if engine remains stable at idle and low speeds. Twin or multiple carburettors: if confined to cylinders fed by one carburettor check air flow balance and re-adjust mixture. If mixture changes when returning to idle after an increase in idle speed, this is possibly due to worn throttle spindle on fixed choke (usually accompanied by slight richness at 1000 - 1500rpm. On variable choke it confirms sticking piston.<br><br>**2** Cold start enrichment device not functioning correctly. Serious needle/jet wear - CD and SU Types. |
| | **Variable choke** (CD, SU etc.) | Needle shoulder not flush with piston underside (low). (Does not apply to adjustable needle type CD). Piston incorrectly fitted (or sticking up). Emission carbs may have limited adjustment but some yellow should be visible. | |
| **2 At idle** Blue cannot be achieved - yellow visible regardless of adjustment. | **Fixed choke** or carburettor with separate idle circuit. | Blocked idle air bleed or idle fuel jet not screwed firmly home or intermittent yellow indicates very high float level allowing main circuit to feed too early. | |
| | **Variable choke** | Needle shoulder not flush with piston underside (high). (Does not apply to adjustable needle type CD). Piston incorrectly fitted or sticking (down) or flooding due to faulty float valve. Very occasional yellow flashes which can occur at idle due to engine 'shake' should be ignored, but check ignition timing for over advance and check engine mountings. Follow warm-up instructions precisely. | |
| **3 At idle** Yellow appears after prolonged idle, reverting to blue at idle after a short period at 3000rpm. | **All types** | Slight leak past float valve. (Alternatively on emission CD and SU types only - resulting from high carburettor temperature, no remedy unless the insulator block is not fitted between the carburettor and the manifold). | |

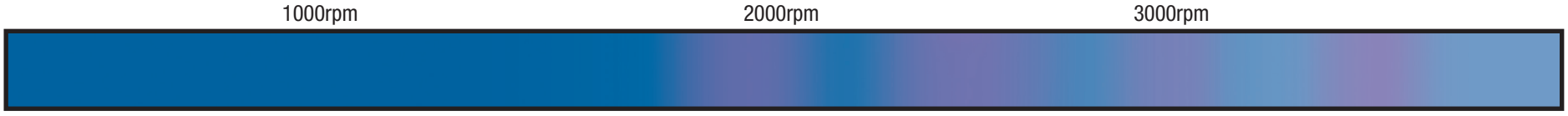
# TEST 2

Gradually increase engine speed by opening the throttle.

**Correct appearance of combustion during test**

Bunson blue — Light emission increases slightly - lighter blue (sometimes with a pinkish hue).

1000rpm — 2000rpm — 3000rpm



**Incorrect appearance and effect of faults during test**

| Steps | Type of Fuel System | Fuel System Fault | Notes |
|---|---|---|---|
| **4 At 1000 - 1700rpm** Yellow flame appears. | **Fixed choke** or carburettor with separate idle circuit. | Restricted idle air bleed circuit. | **4** CO and SU types fitted with a 'biased' (light spring loaded) needle. Wear may well become noticeable at 40,000 miles approx. Wear patterns varies depending on vehicle use.<br><br>**Typical symptoms:**<br>(A) Idle mixture correct with jet screwed in further than usual (Normal position 2-3 turns out from flash with casting) accompanied by engine instability at 50-60mph and during acceleration.<br>(B) As fault 4.<br>(C) As fault 9.<br><br>**7** CO and SU types (or other carburettors where one mixture adjustment effects the whole speed range). Air leaks in the manifold will have a greater effect at idle when manifold depression is high - this results in the carburettor being set 'rich' to compensate at idle and a rich mixture will then be observed at higher speeds. Thus an air leak with this type of carburettor can cause a rich mixture above idle speed.<br><br>**10** Slight restriction in the main circuit or incorrect main jet may only be noticeable at high speeds with the engine under load - this would not be detected using Colortune. |
| | **Variable choke** (CD, SU etc.) | Worn metering needle, inspect for 'scuff' marks at thickest end of taper. See Note 4. | |
| **5 At 1000 - 1700rpm** Light blue and engine unstable. | **Fixed choke** or carburettor with separate idle circuit. | Restricted idle fuel circuit. | |
| **6 At 1150 - 1400rpm** Intermittent yellow flame. | **Fixed choke** | Main circuit feeding in 'blobs' observe with air cleaner removed and if confirmed lower float height marginally e.g., 1-2mm. | |
| **7 At 1250 - 1400rpm** Constant yellow flame. | **CD Stromberg type only** | Hole in diaphragm. Large splits will result in rich mixture at all speeds above idle. | |
| **8 At 1350 - 3500rpm** Some cylinders incorrect. | **Twin and multiple carburettors** | Inaccurate air balancing can result in one carburettor being set incorrectly at idle to achieve blue in all cylinders. Shows up as error when speed is increased. This will also cause one mixture adjustment to be vague at idle and other(s) to be very sensitive. | |
| **9 At 1400 - over 2000rpm** White/blue and engine unstable, improves as speed rises. | **Fixed choke** | Float level too low. | |
| | **Variable choke** | Worn metering needle and jet - replace both. See Note 4. | |
| **10 At any speed above 1400rpm** White/blue and engine unstable; does not improve as speed rises. | **Fixed choke** | Blocked main jet possibly water in fuel system. | |
| **11 At 2400 - over 4000rpm** Yellow appears at high rpm only. | **All types** | A severely contaminated air cleaner will show at higher speeds using Colortune. Much more regular changing is advised as an air cleaner in this condition will have a pronounced affect on fuel consumption (a visual check is often deceiving). | |

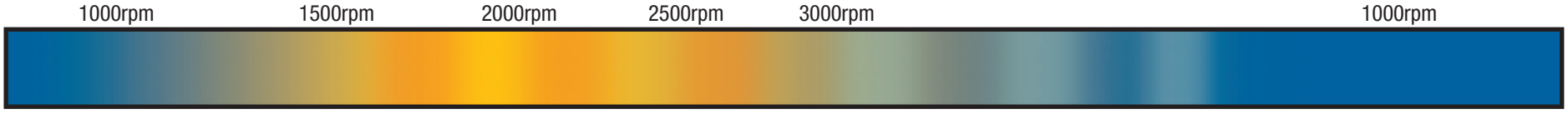
# TEST 3

Rapidly increase engine speed by opening the throttle and close at 3000rpm.

**Correct appearance of combustion during test**

Bunson blue — Light emission increases slightly - lighter blue (sometimes with a pinkish hue). — Dulls as engine speed steadies at 1000rpm again

1000rpm — 1500rpm — 2000rpm — 2500rpm — 3000rpm — 1000rpm



**Incorrect appearance and effect of faults during test**

| Steps | Type of Fuel System | Fuel System Fault | Notes |
|---|---|---|---|
| **12 At any speed** Yellow not visable. | **Fixed choke** | Accelerator pump inoperative: check for blocked pump jet or seized accelerator pump piston on some types. Where accelerator pump has adjustable travel, set to minimum stroke which gives smooth acceleration and yellow combustion flame. | **12** On simple carburettors which have no acceleration enrichment device it may be necessary to run slightly richer above idle speeds if 'flat spots' or hesitation is noticeable during acceleration. With emission controlled carburettors a yellow flame maybe less evident. |
| | **Variable choke** | Insufficient oil in air valve damper or damper bush is worn. (Engine oil is usually advised for topping up). | |